V.90 Internal Voice/Fax Windows Modem

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User's Manual

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Introduction

Thank you for purchasing the *Action*tec 56K ISA Advantage V.90 internal modem. The Advantage incorporates the latest technology in host-based V.90 modems. This new technology provides vast improvements in both the performance and the capabilities of personal computer fax/modems.

Controller-less modems, also known as Win Modems or Windows Modems, utilize your computer's Central Processing Unit (or CPU) to perform some of their functions. The modems on-board Digital Signal Processing (DSP) circuitry handles the most processor-intensive functions such as V.90 and V.34 modulation leaving the system CPU to perform mundane tasks like data compression. This sharing of system resources results in a streamlined, more reliable modem that does not tax overall system speed. This modem also benefits from greater access to memory and disk storage space through the system CPU.

Because their control code resides on disk and is easily upgradable, host-based modems keep up with advances in speed and capabilities that Personal Computers make. Simply download the new driver, follow the installation instructions, and reboot your system to take advantage of the latest improvements in personal computer hardware design and performance.

Contacting *Action*tec Customer Support

*Action*tec Electronics prides itself on making high-quality, durable, high-performance products. If you should need assistance, the *Action*tec Technical Support Department is available from 7:00 AM to 7:00 PM Pacific Coast Time, Monday through Friday to provide professional support.

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New drivers are released as need arises to insure maximum compatibility and operation of your new modem. Find out about these and other new *Action*tec products at the *Action*tec web site:

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Do This First

Please read the following tips before attempting to install your new modem.

For Windows 95 and Windows 98 Installations

Be sure to remove all other modem drivers from your operating system. To do this, right-click **My Computer,** choose **Properties** from the menu that appears, then click on the **Device Manager** tab. Double-click the **Modems** icon in the list of devices to show the modems installed. Click once on the icon next to any modems in this list to select them. When all of the modems are selected, click **Remove.**

Turn off the computer and physically remove your old modem from the system. *Once you remove the old modem and its drivers from your system, you will need the old modem driver diskette if you wish to reinstall it at a later date.*

Restart the computer. On the taskbar, click **Start.** On the **Start** menu, click **Settings,** then click **Control Panel.** Double-click on the **Modems** icon. Select all of the listed modems and click **Remove.** Shut down (rather than restart) the computer. Wait 5 seconds before turning it back on.

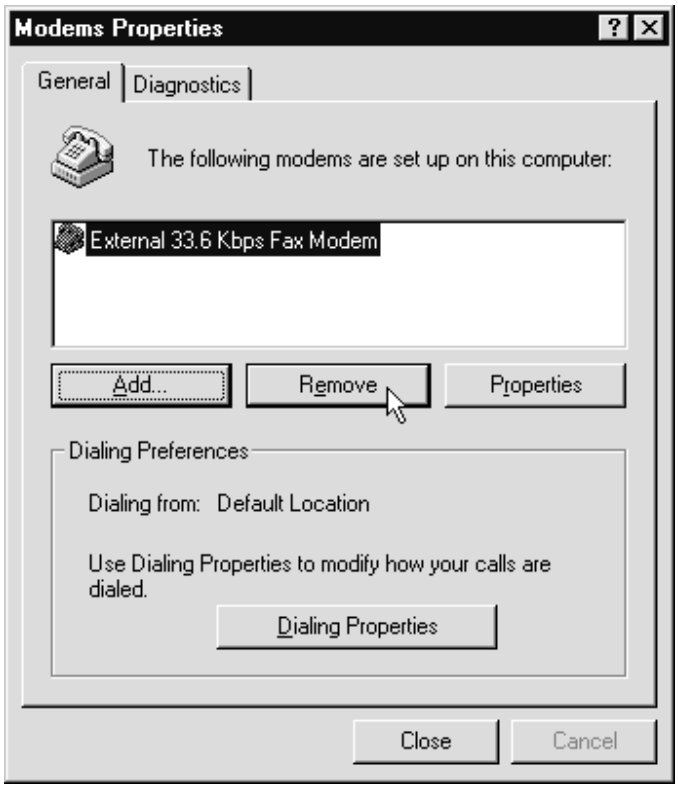

Figure 1: The Modems Properties Panel

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If you are going to use the Telephone Answering Machine (TAM) functions of the modem and you are running Windows 95, you need to install a software component called Unimodem V. If you have Windows 95 OEM Service Release 2 (Version 4.00.950 B) or a later version of Windows, this component comes standard as part of the operating system.

To find out which version of Windows 95 you are using, right click the **My Computer** icon on the desktop, and choose **Properties** from the menu that appears. If the version of Windows 95 is 4.00.950 or 4.00.950A, go to the UNIMODEM directory of the CD-ROM that came with your modem and right-click on the **UNIMODV.INF** icon, (this may be named **UNIMODV**) then click on **Install.**. Restart your computer to enable the drivers.

Make sure you have an available COM port and IRQ on your computer. The modem needs one IRQ and one COM Port in order to function. To check which interrupts are available on your system, double-click on the **System** icon in Control Panel and click the **Device Manager** tab. Highlight **Computer** in the dialog box and click **Properties.** There are only 16 (0 to 15) interrupts in a PC system. Make a note of any interrupt not listed.

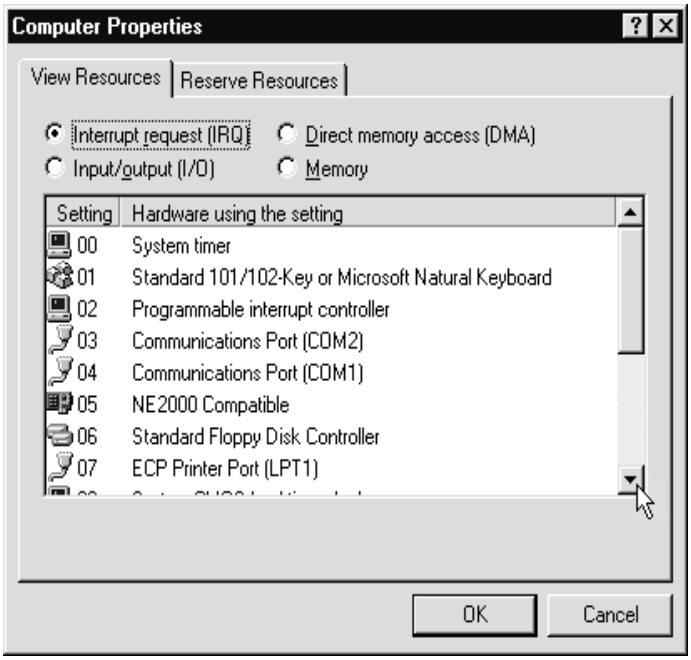

Figure 2: Windows 95 IRQ Resources Dialog Box

If you do not have any free interrupts you may need to disable a COM port for an installed device that you are not currently using, such as COM2.

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To disable COM2, boot your system and enter your BIOS setup. You can normally invoke the BIOS setup menu by pressing a key or a combination of keys at the first boot up screen. Some of the common keys are DELETE, F1, F2, CTRL+ALT+S, CTRL+ALT+ESC. (Watch the text that appears as you turn your computer on--there will probably be instructions on how to enter "SETUP"--following these instructions will give you access to the BIOS. If none of these key combinations work, refer to your computer's user's manual for instructions on how to access the BIOS setup.

Once inside the BIOS setup, find the menu for "integrated peripherals," locate the COM port settings, then disable COM2 or Comport B. **Save your settings before exiting the BIOS Setup.** The computer will reboot.

Disable the COM port in Device Manager as well. To do this, right-click the **My Computer** icon on the desktop, and choose **Properties** from the menu that appears. Click the **Device Manager** tab. Double-click the **Ports (COM & LPT)** icon to expand the list and click **Communication Port (COM2)** to select it. Click **Properties.** Click to select **Disable in this hardware profile** in Windows 95B and Windows 98, or click to deselect **Original Configuration (current)** in Windows 95 or Windows 95A. Restart your system.

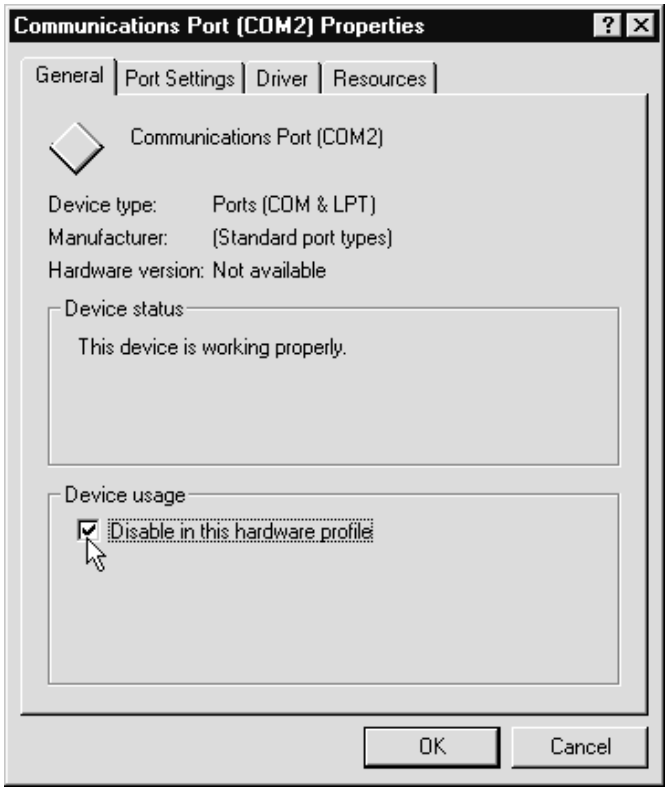

Figure 3a: COM2 Properties Dialog Box

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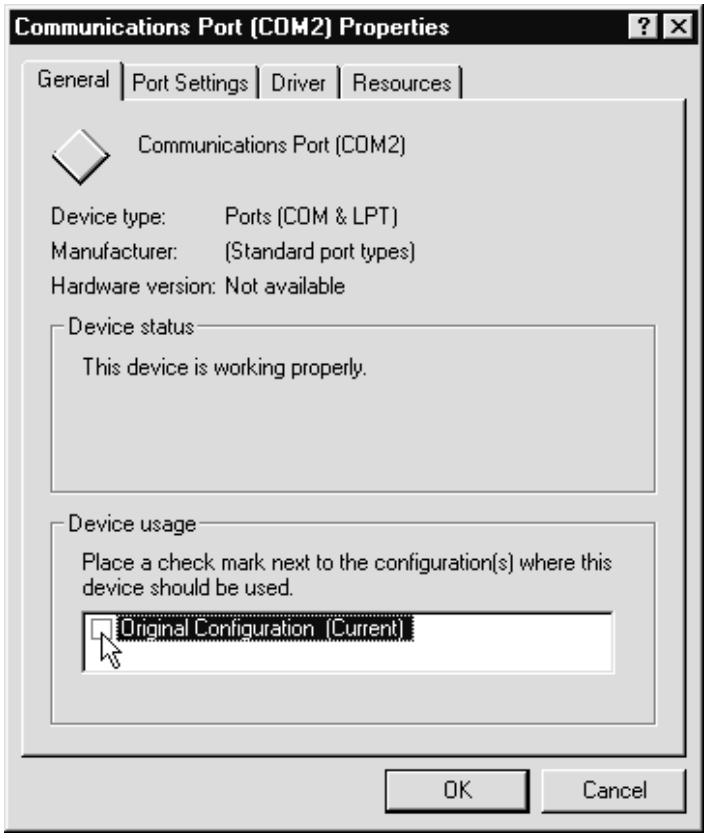

Figure 3b: Windows 95 (or 95A) COM2 Disable Panel

Proceed to the section titled "Installing the Modem."

For Windows NT 4.0 Installation

Remove all other modem drivers from your operating system. On the **Start** menu, click **Settings** then click **Control Panel.** In Control Panel, double-click on the **Modems** icon. Select the modem you wish to remove and click **Remove.** Turn off the computer and physically remove the modem from your system. Do not install your new modem at this time. Follow the procedures below. *Once you remove the old modem and its drivers from your system, you will need the old modem driver diskette if you wish to reinstall it at a later date.*

On the **Start** menu, click **Programs,** then click **Administrative Tools,** then click **Windows NT Diagnostics.** Click the **Version** tab. "Service Pack 3" (or greater) should be installed in Windows NT 4.0.

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Before installing the modem, you must enable ISA Plug-N-Play support within Windows NT. First set your system BIOS to "PnP OS" and then insert the Windows NT 4.0 CD-ROM into your systems CD-ROM Drive. The Startup window for Windows NT 4.0 should appear after a few moments. Click **Browse This CD.** Double-click the **Drvlib** folder. From the new panel double-click on the **Pnpisa** folder. Another panel will appear. Double-click on the **x86** folder. The contents of this folder should contain a file labeled **Pnpisa**. Right-click the file's icon and a pop-up menu will appear. From this menu click **Install.** After ISA Plug-N-Play is enabled, restart your system. When the system has restarted, in **Control Panel** double-click on the **Devices** icon. Scroll down the new menu and highlight **PnP ISA Enabler Driver**. Click the **Startup** button and select the **System** option. See Fig.4 below.

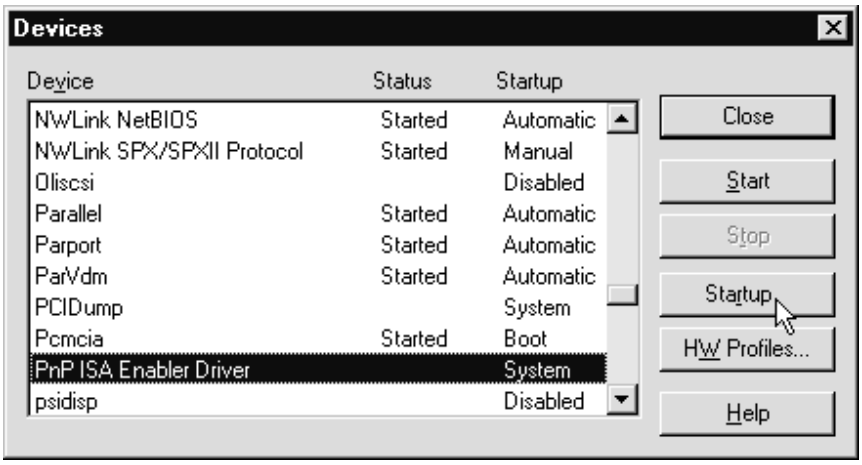

Fig. 4: Devices Window

Proceed to the section titled "Installing the Modem."

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Installing The Modem

Always discharge static electricity before handling your modem. You may discharge static electricity by touching a grounded metal structure or by using any commercially available grounding strap.

Make sure the expansion slot type is 16-bit, which has two slots to fit the ISA card. 8-bit slots have only one connector. If you use an 8-bit slot, the modem will not have access to the higher interrupts (IRQ 9-12).

The position of the expansion slots in your computer may differ from the illustration shown but the installation procedure should be the same.

Hardware Installation

1. Turn off the computer and all peripheral devices connected to it.

2. Unplug the computer power cord from the wall receptacle.

3. Remove the computer's cover. Refer to your computer owner's manual for instructions.

4. Remove the screw securing the expansion slot cover behind one of the computer's available 16-bit ISA expansion slots. Lift the expansion slot cover out as shown below.

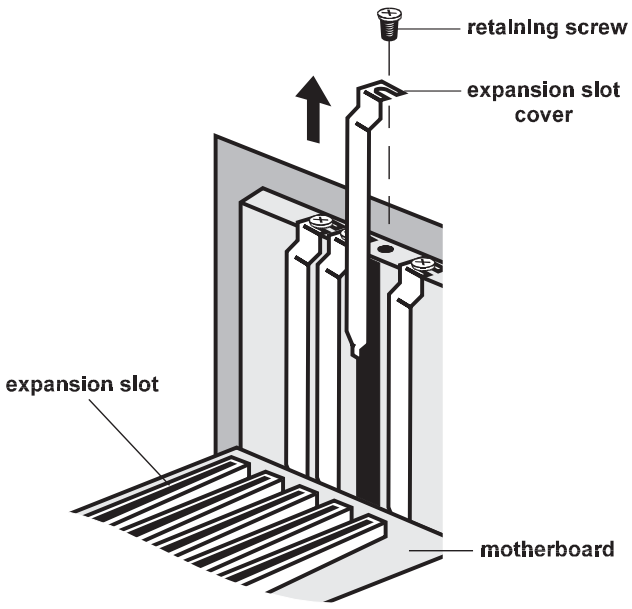

Figure 5: Removing the Backplate

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5. Firmly, but gently, insert the modem into the available 16-bit expansion slot. Ensure that the card is seated properly before securing it with the screw removed in Step 4, as shown in the following diagram:

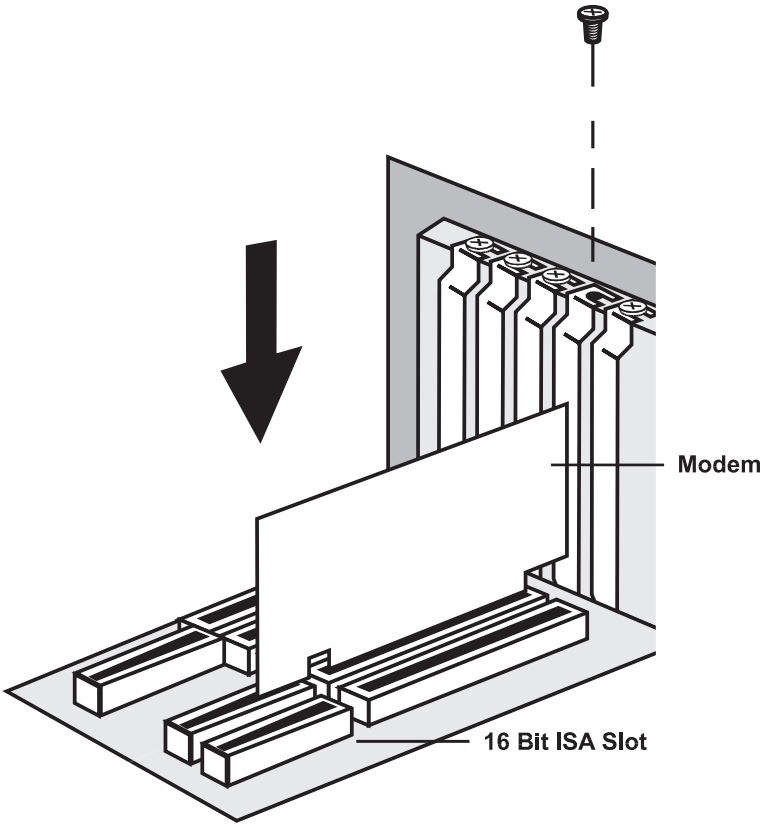

Figure 6: Installing The Modem

6. Put the chassis cover back on the computer.

7. Be sure that all power switches are in the OFF position, then reconnect the power cables to the computer and its peripherals.

8. Connect the telephone line cable to the "Line (Telco)" jack as shown in Figure 7.

9. Turn on the computer and proceed to the following sections to configure your modem to the operating system you are using.

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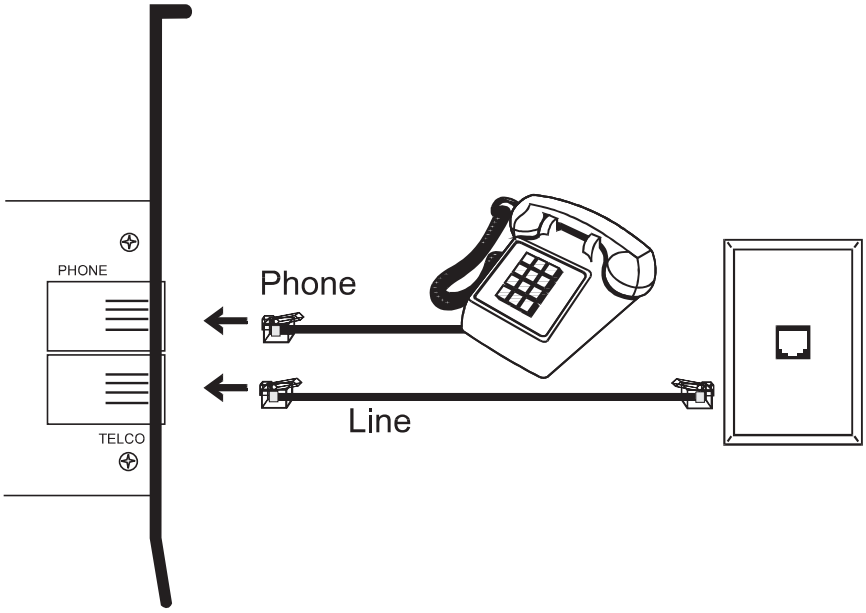

Fig.7: Connecting Devices

On the rear panel of your modem are input jacks to connect devices to the modem. As shown in the diagram, there are jacks for connection to a "phone" and to a phone "line." *The connector labeled Line (Telco) is meant to be connected to a standard analog phone line.*

To help reduce the load on your phone line, it is recommended that the modem be the only device connected.

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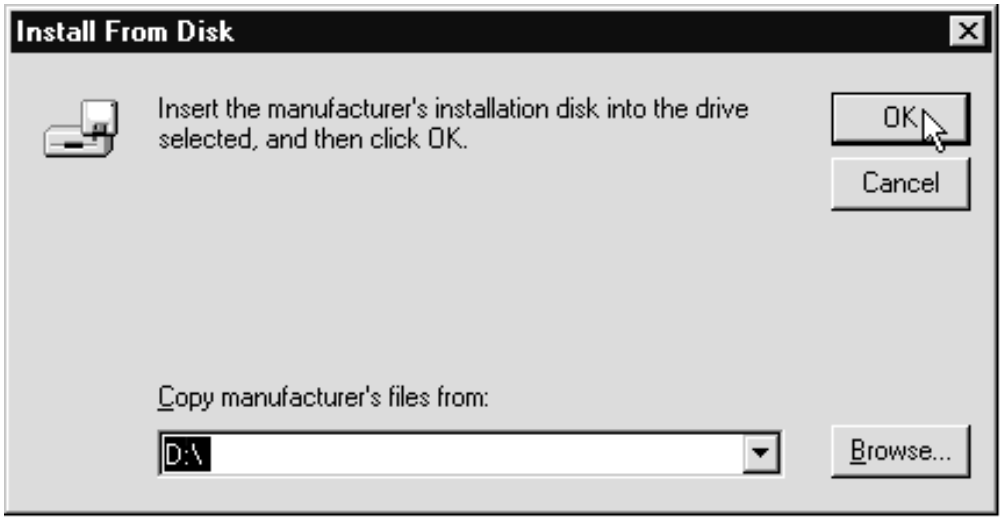
Configuring Windows 95

Step 1 Upon startup, Windows 95 detects the modem and displays the **New Hardware Found** dialog box. Select "Driver from disk provided by hardware manufacturer" then click **OK**.

New Hardware Found
LT Win Modem
Select which driver you want to install for your new hardware:
Windows default driver
Driver from disk provided by hardware manufacturer
Do not install a driver (Windows will not prompt you again)
Select from a list of alternate drivers
OK
Cancel
Help

Step 2 Type your CD-ROM drive's drive letter into the **Copy manufacturer's files from** box. Insert the Installation CD-ROM and click **OK.**



Step 3 If Windows asks for an installation disc, click **OK** and type the drive letter for you CD-ROM drive in the dialog box that appears and click **OK**.

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Step 4 After the installer has copied the .INF files to the hard disk, a **New Hardware Found** dialog box should appear prompting for the "Wave Device for Voice Modem". Click **OK**. (See "Do This First" for information on UNIMODEM.INF if this screen does not appear).

New Hardware Found
Wave Device for Voice Modem
Select which driver you want to install for your new hardware:
Windows default driver
Driver from disk provided by hardware manufacturer
Do not install a driver (Windows will not prompt you again)
Select from a list of alternate drivers
OK
Cancel
Help

Step 5 Click **OK** to copy the Wave Device .INF file from the CD-ROM drive to the hard drive. Windows may request its own installation diskettes for some files. Insert the Windows CD-ROM as required.

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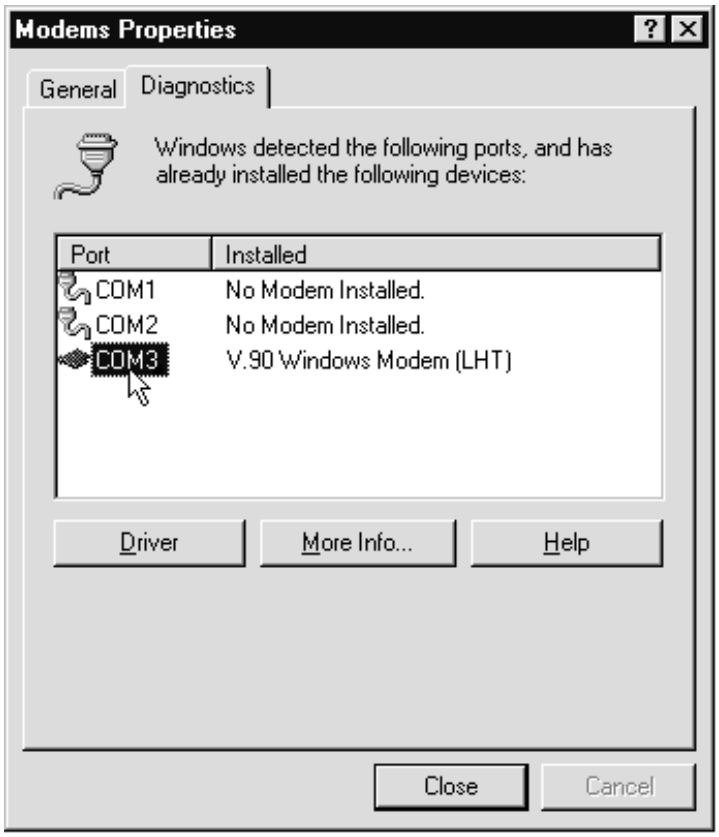
Step 6 To determine what COM port and IRQ is assigned to the modem in Windows 95, click on the **Modems** icon in **Control Panel** and select the **Diagnostic** tab. Click on the COM Port icon and then on the **More Info** button to view the modem properties.



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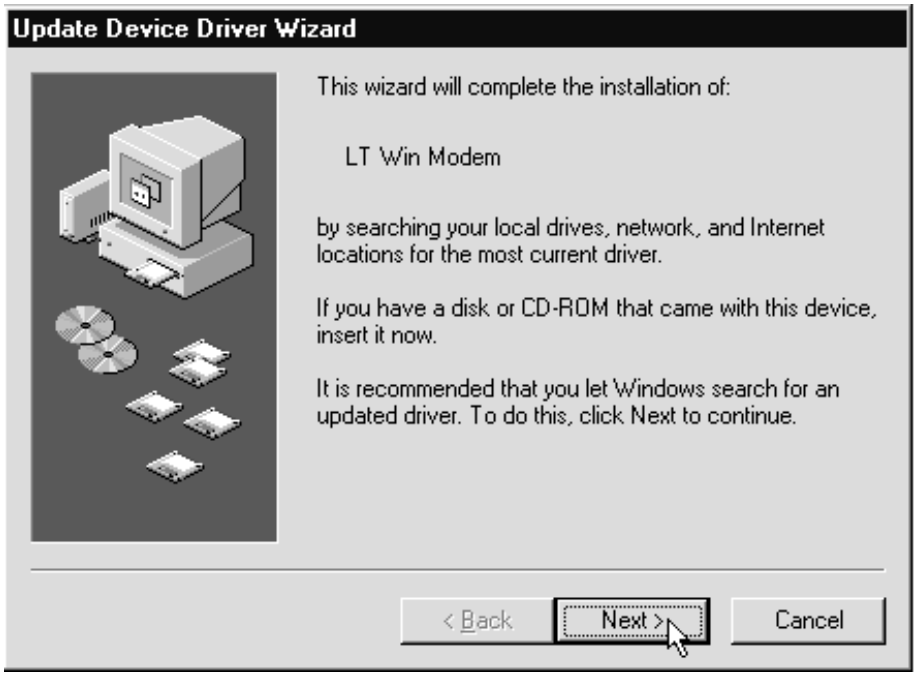
Configuring Windows 95 OEM SR2

Step 1 Upon startup, Windows 95 detects the modem and launches the **Update Device Driver Wizard** dialog box. Insert the modem's installation CD-ROM and click **Next.**


Update Device Driver Wizard
This wizard will complete the installation of:
LT Win Modem
by searching your local drives, network, and Internet locations for the most current driver.
If you have a disk or CD-ROM that came with this device, insert it now.
It is recommended that you let Windows search for an updated driver. To do this, click Next to continue.
< Back
Next >
Cancel

Step 2 After Windows 95 has found the updated drivers for your modem, click **Finish.**

Update Device Driver Wizard
Windows found the following updated driver for this device:
V.90 Windows Modem (LHT)
If you want to use this driver, click Finish. If this is not the correct driver and you want to search for a different driver manually, click Other Locations.
Location of Driver
Other Locations...
< Back
Finish
Cancel

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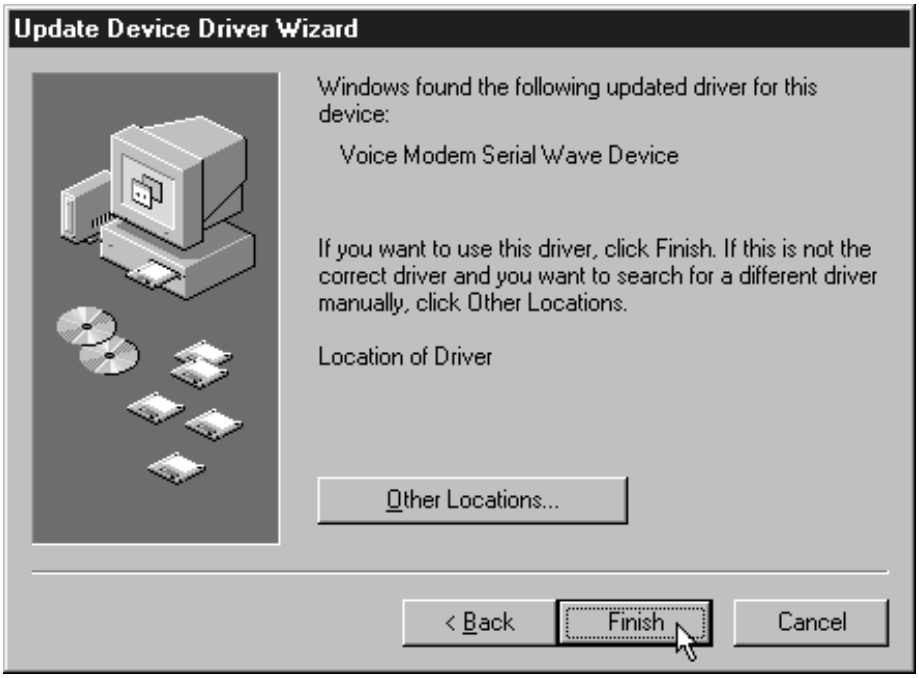
Step 3 If Windows asks for its own installation disc, click **OK.** Insert the requested CD-ROM, type the drive letter of your CD-ROM in the dialog box that appears next, and click **OK.**

Step 4 After the Wizard has copied the .INF files to the hard disk, it should detect "Wave Device for Voice Modem" and prompt for its driver. Click **Next.**

Update Device Driver Wizard
This wizard will complete the installation of:
Wave Device for Voice Modem
by searching your local drives, network, and Internet locations for the most current driver.
If you have a disk or CD-ROM that came with this device, insert it now.
It is recommended that you let Windows search for an updated driver. To do this, click Next to continue.
< Back
Next >
Cancel

Step 5 Click **Finish** to copy the Wave Device .INF file from the CD-ROM drive to the hard drive. Windows may request its own installation diskettes for some files. Insert the Windows CD-ROM as required.


Update Device Driver Wizard
Windows found the following updated driver for this device:
Voice Modem Serial Wave Device
If you want to use this driver, click Finish. If this is not the correct driver and you want to search for a different driver manually, click Other Locations.
Location of Driver
Other Locations...
< Back
Finish
Cancel

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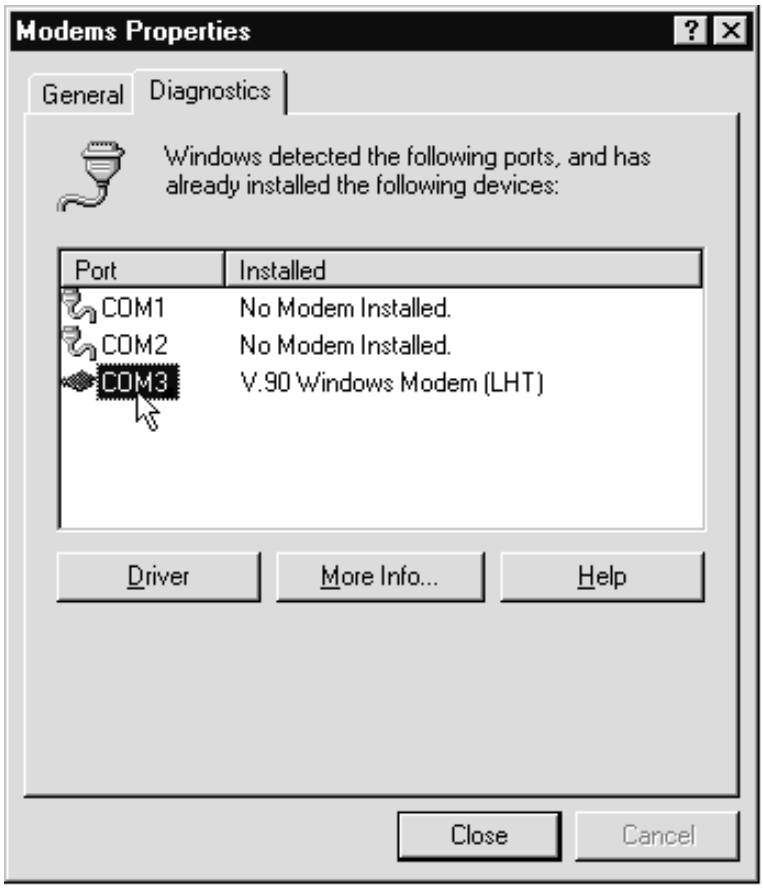
Step 6 To determine what COM port and IRQ is assigned to the modem in Windows 95, click on the **Modems** icon in **Control Panel** and select the **Diagnostics** tab. Select your modem and then click on the **More Info** button to view the modem properties.



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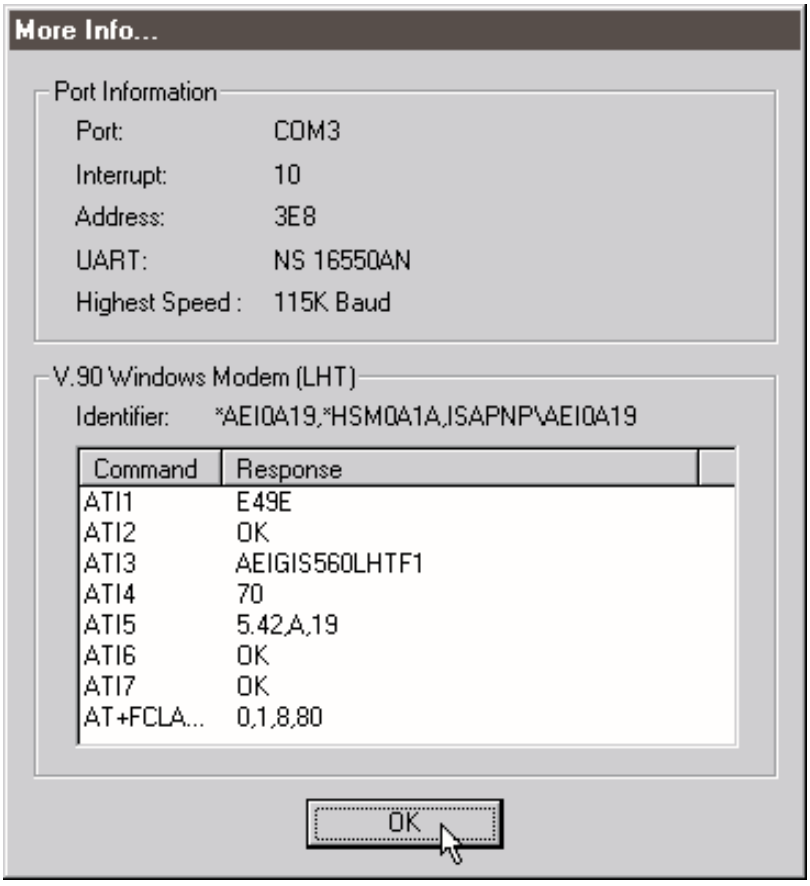
Step 7 Remember this COM port number. When you install your Data/Fax software or internet browser program, you may need to set your modem port location to this same number.



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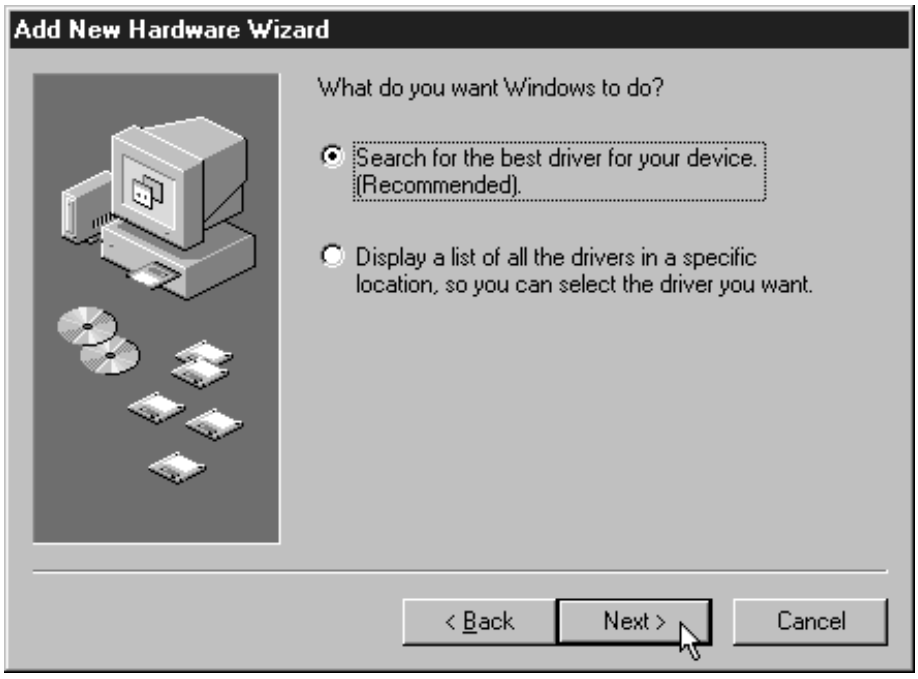
Configuring Windows 98

Step 1 After installing the modem hardware, turn on your computer. Windows will detect the modem and start the Add New Hardware Wizard. Click **Next.**

Add New Hardware Wizard
This wizard searches for new drivers for:
LT Win Modem
A device driver is a software program that makes a hardware device work.
< Back
Next >
Cancel

Step 2 The Add New Hardware Wizard will ask if you would like it to "search for the best driver for your device (Recommended)." If this option is not already selected, click it, then click **Next.**


Add New Hardware Wizard
What do you want Windows to do?
Search for the best driver for your device. (Recommended).
Display a list of all the drivers in a specific location, so you can select the driver you want.
< Back
Next >
Cancel

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Step 3 The Wizard will ask where it should search for the drivers. Click "CD-ROM drive" to select it. Make sure the installation CD-ROM is in the CD-ROM drive. Click **Next.**

Add New Hardware Wizard
Windows will search for new drivers in its driver database on your hard drive, and in any of the following selected locations. Click Next to start the search.
Floppy disk drives
CD-ROM drive
Microsoft Windows Update
Specify a location:
A:\
Browse...
< Back
Next >
Cancel

Step 4 Next the Wizard will identify the driver file and report its location on the CD-ROM drive. Click the **Next** button to copy and install the driver.

Add New Hardware Wizard
Windows driver file search for the device:
V.90 Windows Modem (LHT)
Windows is now ready to install the best driver for this device. Click Back to select a different driver, or click Next to continue.
Location of driver:
D:\LTDFT.INF
< Back
Next >
Cancel

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Step 5 After copying the files to your hard drive, the wizard will report that it is finished installing the drivers for the modem. Click **Finish.**

Add New Hardware Wizard
V.90 Windows Modem (LHT)
Windows has finished installing the software that your new hardware device requires.
< Back
Finish
Cancel

Step 6 Windows will now detect a "Wave Device for Voice Modem" and start the Add New Hardware Wizard again to find the drivers for the voice capabilities of your modem. Click **Next.**

Add New Hardware Wizard
This wizard searches for new drivers for:
Wave Device for Voice Modem
A device driver is a software program that makes a hardware device work.
< Back
Next >
Cancel

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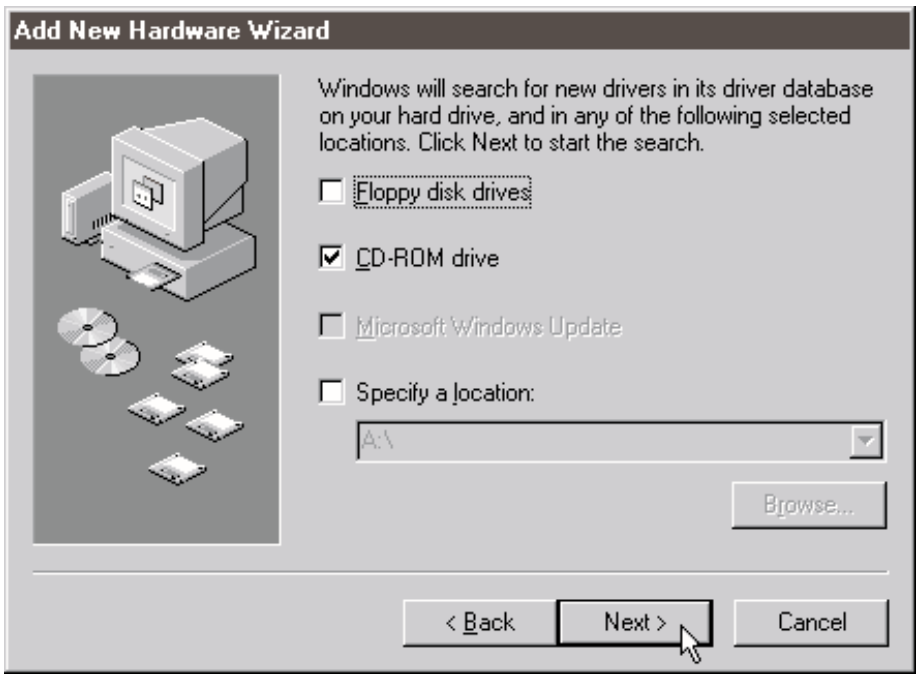
Step 7 The Add New Hardware Wizard will ask if you would like it to "search for the best driver for your device (Recommended)." If this option is not already selected, click it, then click **Next.**

Add New Hardware Wizard
What do you want Windows to do?
Search for the best driver for your device. (Recommended).
Display a list of all the drivers in a specific location, so you can select the driver you want.
< Back
Next >
Cancel

Step 8 The Wizard will ask where it should search for the drivers. Click "CD-ROM drive" to select it. Make sure the installation CD-ROM is in the CD-ROM drive. Click **Next.**


Add New Hardware Wizard
Windows will search for new drivers in its driver database on your hard drive, and in any of the following selected locations. Click Next to start the search.
Floppy disk drives
CD-ROM drive
Microsoft Windows Update
Specify a location:
A:\
Browse...
< Back
Next >
Cancel

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Step 9 Next the Wizard will identify the driver file and report its location on the CD-ROM drive. Click the **Next** button to copy and instal the driver.

Add New Hardware Wizard
Windows driver file search for the device:
Voice Modem Serial Wave Device
Windows is now ready to install the best driver for this device. Click Back to select a different driver, or click Next to continue.
Location of driver:
D:\LTWAVE.INF
< Back
Next >
Cancel

Step 10 Windows will copy and install the files, and then display the dialog box below, reporting that the process has finished. Click **Finish.**

Add New Hardware Wizard
Voice Modem Serial Wave Device
Windows has finished installing the software that your new hardware device requires.
< Back
Finish
Cancel

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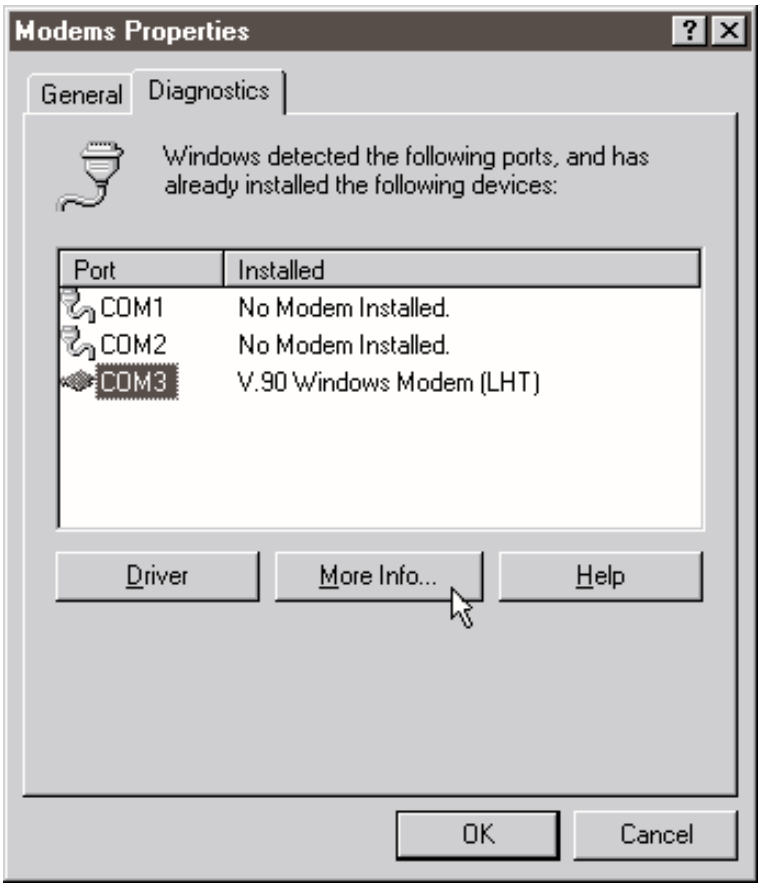
Step 11 Windows will finish loading. To make sure your modem has been installed correctly, click **Start** on the taskbar. On the **Start** menu, click **Settings,** then click **Control Panel.** In **Control Panel,** double-click the **Modems** icon, then click the **Properties** tab to bring it to the front. On the Modems Properties tab, click the COM port number (COM 3 in the illustration below) to select the modem, then click **More Info.**



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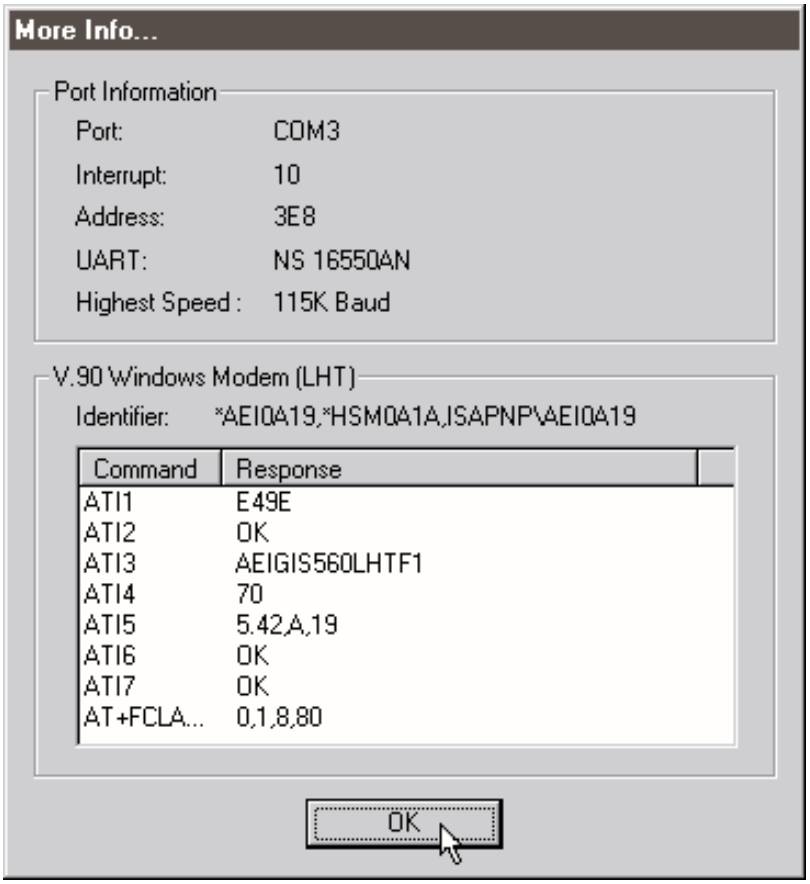
Step 12 Check that the More Info dialog box that appears on your screen matches the illustration below. Make a note of the interrupt (also known as an IRQ) and the port number. These will be needed to configure your communications software.



Your modem is now installed and configured for use with Windows 98.

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Configuring Windows NT 4.0

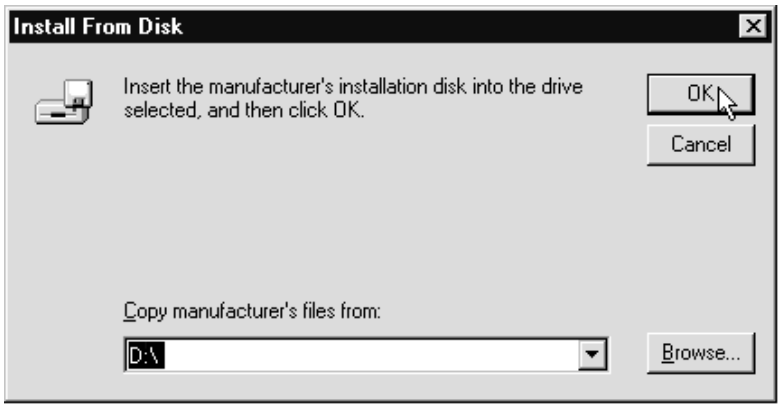
Before installing the modem, make sure you have installed the PnP ISA Enabler and the latest Service Pack upgrade to Windows NT 4.0. See the section titled "Do This First" for details.

Step1 Install the modem hardware and turn on your computer. Upon startup, Windows NT 4.0 detects your modem and displays the **New Hardware Found** dialog box. Select "**Driver from disk provided by hardware manufacturer**" then click **OK**.

New Hardware Found
LT Win Modem
Select which driver you want to install for your new hardware:
Windows default driver
Driver from disk provided by hardware manufacturer
Do not install a driver (Windows will not prompt you again)
Select from a list of alternate drivers
OK
Cancel
Help

Note: Windows NT may detect other devices in your computer. If so, select "Do not install a driver (Windows will not prompt you again)" for these devices.

Step 2 Insert the modems installation CD-ROM and click **OK**.



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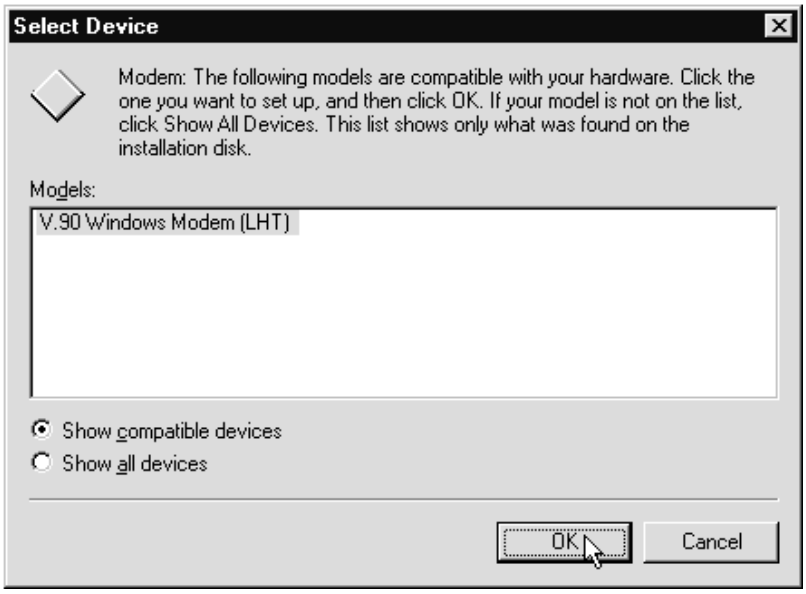
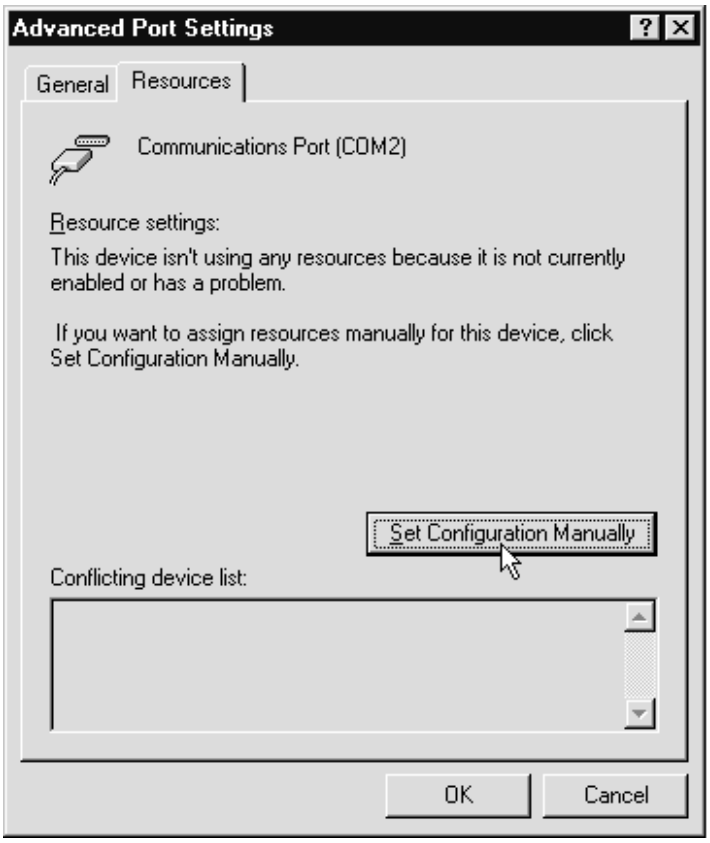
Step 4 A panel for selecting the device to be installed should appear. Highlight the "V.90 Windows Modem (LHT)" selection and click **OK**.


Select Device
Modem: The following models are compatible with your hardware. Click the one you want to set up, and then click OK. If your model is not on the list, click Show All Devices. This list shows only what was found on the installation disk.
Models:
V.90 Windows Modem (LHT)
Show compatible devices
Show all devices
OK
Cancel

Step 5 If you see the following dialog box, you will need to set the configuration manually.


Advanced Port Settings
General
Resources
Communications Port (COM2)
Resource settings:
This device isn't using any resources because it is not currently enabled or has a problem.
If you want to assign resources manually for this device, click Set Configuration Manually.
Set Configuration Manually
Conflicting device list:
OK
Cancel

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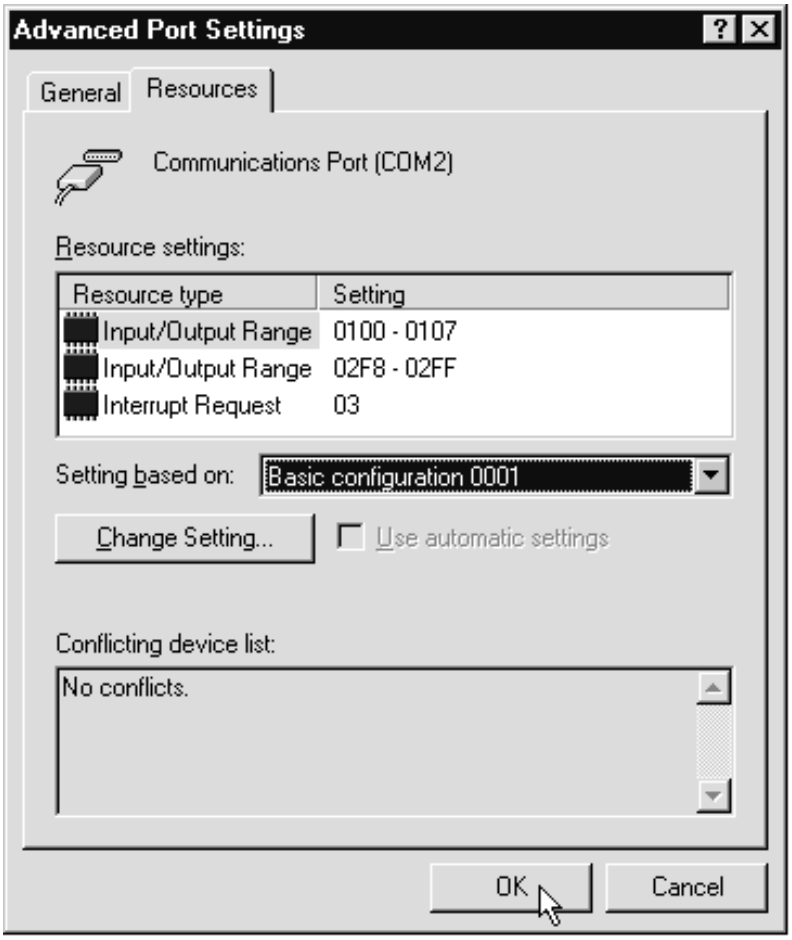
Step 6 Select the Resource Settings which do not cause any conflicts with other devices.



Step 7 Restart your computer.

Step 8 Click on the **Modems** icon in the **Control Panel**. Verify that Windows NT has correctly found the modem.

Step 9 If you wish to use your modem to dial into a Windows NT Remote Access Server or wish to connect to the Internet, you will need to configure Dial-up Networking. If you do not see the Remote Access Setup Panel installation, In Control Panel double-click the **Network** icon. Click on the **Services** folder and select **Remote Access Service**. If no Remote Access Service option is listed click **Add.** Select **Remote Access Service.** and click **OK.** Windows NT may ask for its own CD-ROM for some files. Insert as required. After you have installed Remote Access Service add the appropriate protocols as directed.

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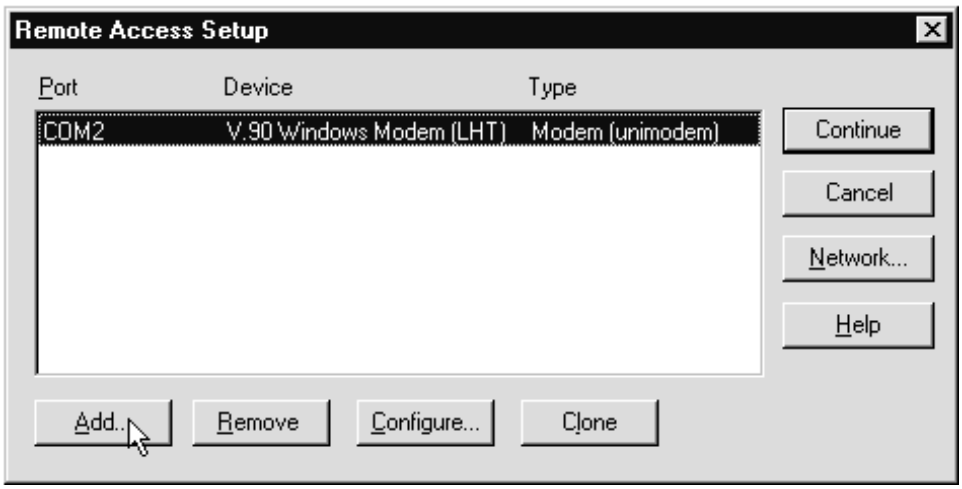
Step 10 At the **Remote Access Setup** dialog box, click on **Add.** Select the Remote Access Setup device you wish to add and Click **OK.**



Step 11 Click **Continue** to finish the installation.

Step 12 After Windows NT has completed the binding process, allow Windows NT to shut down and restart the computer.

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Installing and Configuring Communications Software

If your modem came with a communications software package, it is strongly recommended that you use this software for your modem. It's default installation parameters have been specially configured to work with this modem. The Users Guide for this program can be found inside the modem package. It can be supplied in either soft-bound copy or on CD-ROM (depending on the model you purchased). Some configurations are packaged without communications software. Check your packaging to see if communications software is included.

If you wish to use another software package, be sure that it supports this modem. Most Software Manufacturers have a listing of supported modems on their websites or BBSs. Check these sites to see if this model is supported. If you are unsure or your brand of software supports only a few modems, try selecting "Hayes Compatible" or "Standard Modem." This may work in certain cases.

Some software programs allow manual input of parameters. For the users of these programs, here is a listing of the Data/Fax/Voice Command Standards supported.

Data:	TIA/EIA-602
Fax:	TIA/EIA-578 for Class 1 Fax
Voice:	TIA IS-101 support for TAD (Telephone Answering Device)
Init String:	**AT&F&C1&D2W2**

TIA IS-101 Commands *not* supported:

Caller ID
Full Duplex Speakerphone
VoiceView

Note: some programs must be configured to communicate with the modem on the same COM port and or IRQ setting used by the modem. See the section titled "Installing the Modem" section for instructions on how to determine your COM Port and IRQ settings.

The Modem's Voice Features

This modem supports TIA IS-101 commands applicable to a Telephone Answering Device. In order to take advantage of this feature, you will need a Sound Blaster® compatible sound card equipped with an external microphone and external speakers. A software application which supports these TAM functions is also required.

A modem based Telephone Answering Machine works by using a sound card equipped with a microphone to record an outgoing message. This message is stored as a .wav file which is transferred to the modem by the application program when an incoming

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call is detected. The modem converts the digital information contained in the .wav file into an audio signal which is then sent over the phone line. The person calling hears your outgoing message and responds with an incoming message.

The sequence of recording an incoming message is the reverse of an outgoing message. The modem converts the audio signal into a digital format and sends it to the application program. The application program then formats and stores the incoming message as a .wav file. When you play back your stored messages by selecting them from within the application program, they are sent to the sound card. You then hear your recorded messages through the sound card's speakers.

The success of this process is dependent on the ability of the application program to communicate with both the sound card and the modem. If you wish to use your modem as a Telephone Answering Machine, experiment with the software witch came with your modem first. Its default parameters have been specially configured to identify and use your modems voice capabilities.

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Troubleshooting

This section lists some common problems and offers suggestions for a solution. It is important to remember that this modem is a Windows 95/98/NT based modem and requires 32bit virtual device drivers. It therefore cannot work in Windows 3.1 which cannot use these drivers. The modem also cannot work in DOS regardless of version. It is a purely Plug-N-Play device and has no provisions for manual configuration.

If you cannot find your particular symptom listed here, it is suggested that you remove the modem and its drivers from the system and reinstall them again (see "Uninstalling the Modem" later in this section). This provides a new, uncorrupted installation and can cure many temporary problems. Be sure to check the "Do This First" section for important system preparation before reinstalling the modem.

Most problems encountered during the Windows installation process are a result of insufficient system resources—no free COM Ports or Interrupts. Problems with Windows NT 4.0 installations are usually a result of not having ISA Plug-N-Play enabled. For these reasons it is strongly recommended that you carefully follow the preinstallation procedures outlined in the **Do This First** section. These steps have been thoughtfully chosen to help minimize difficulties during the installation of the modem in both Windows 95, Windows 98, and Windows NT 4.0.

If your modem has installed but is not functioning, try the troubleshooting procedure listed below.

Windows 95 and Windows 98

Step 1: Check System Resources.

In **Control Panel** double-click the **System** icon. Click the **Device Manager** tab. In the list of devices, double-click the **Modems** icon to show what modems are installed. If there is no **Modems** icon, your modem did not install. If your modem is listed, check that there is no yellow exclamation mark or red "X" over the modem's icon (If there is some alteration to this icon, go to Step 2.) If any other modems are listed, highlight the modem by clicking once on the icon next to the listed modem and then click **Remove.** Turn off your computer. Wait 5 seconds and turn your computer back on. Repeat Step 1.

Step 2: Check Modem Properties.

From the **Device Manager** tab within **System Properties**, double-click the **Modems** icon in the list of devices to show what modems are installed. Highlight your modem by clicking once on the icon and then click the **Properties** button. Read the "Device Status" under the **General** tab to see if the device is working properly. Check the

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Device Usage box and make sure "Disable in this hardware profile" is not selected. (Windows 95 OEM SR2 and Windows 98 only). Make a note of the COM port and IRQ the modem is using.

Errors reported in the **Device Status** box generally refer to conflicts. Click the **Resources** tab and read the "Conflicting Device List." If a conflict is present, click to deselect "Use automatic Setting" and select a configuration that does not cause conflicts. Manually change the address and IRQ settings if needed. (Refer to Windows 95 on-line help for detailed about how to change these settings.) Click **OK.** If there is no setting free of conflicts, turn to the section of this manual titled "Does Not Install."

Step 3: Modem Diagnostics.

In Control Panel double-click the **Modems** icon. Your modem should be listed. If any other modem is also listed, click to select each of these other modems and then click the **Remove** button. Turn off your computer, wait 5 seconds and turn the power back on. Return to Control Panel and double click the **Modems** icon. Click the **Diagnostics** tab. Click the COM port designation next to your modem. Click **More Info.** You should see a dialog box like the one below.

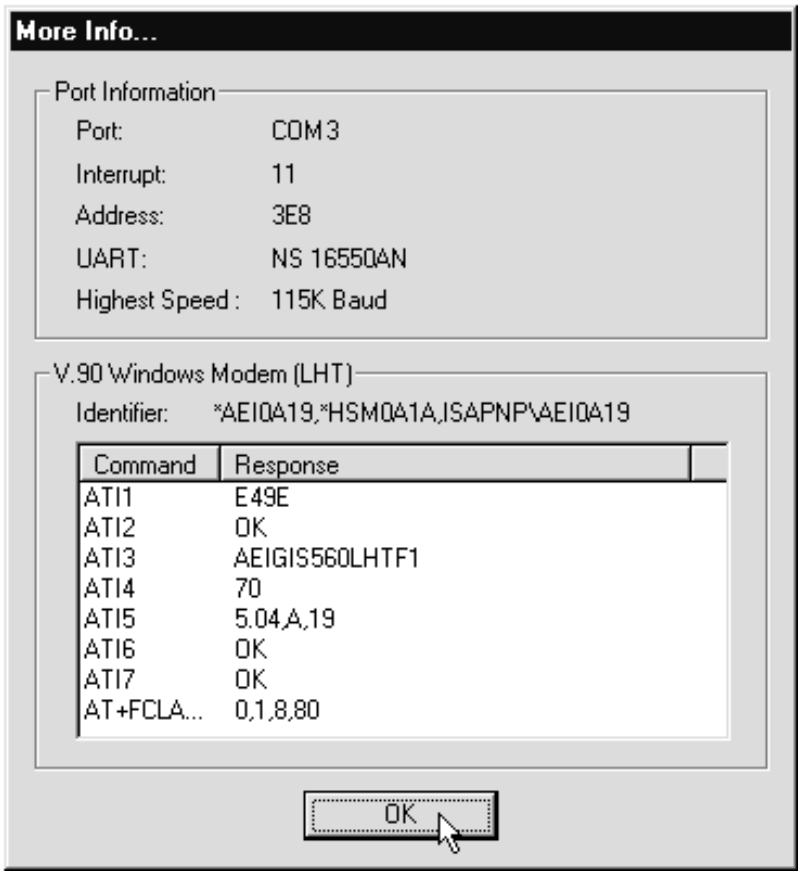

Figure 8: More Info Panel

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If you receive an error message or the panel is blank, go to the section of this manual "Does Not Install."

Step 4: Does Not Install

The most likely reason for a non-installation in Windows 95 or 98 is a lack of IRQ resources. The modem needs one IRQ and one COM Port in order to function. Computers are usually equipped with a sound card, CD-ROM drive, Hard-drive, floppy drive, video card, two COM ports, one LPT port, keyboard, and a mouse. Each of these devices require at least one IRQ (interrupt) in order to function.

This section deals with the process of freeing IRQs and configuring P-N-P (Plug-N-Play) This requires that you know how to enter your computer system's BIOS Setup Routine—read your computer user's manual for information on how to enter into and use the BIOS setup.

Once inside the BIOS Setup, find the Plug-N-Play configuration and check the selection for "Operating System." This can be found within the "Advanced", "PNP/PCI Configuration", or "Plug and Play Configuration" section depending on the BIOS Manufacturer. If you have an Operating System selection, set it to "Plug-N-Play", or if you have "Plug N Play" settings, set them to "on." Next, from the information you noted in Step 2, find the interrupt selection for the IRQ your modem is using (some BIOS don't allow individual selection of interrupts to ISA, Plug-N-Play, or PCI). Set this interrupt to Plug-N-Play. This can be called ICU (ISA Configuration Utility), ICU/PCI, ISA, or PNP depending on your BIOS version and manufacturer. Do not set this interrupt to "PCI" only or to "Legacy ISA".

If you do not have any free interrupts available, you will have to disable a COM port currently in use. See the section of this manual titled "Do This First".

Uninstalling the Modem

If you are uninstalling the modem in Windows in order to upgrade software or reinstall the modem as part of a troubleshooting process, it is important to follow these directions carefully. Following these instructions out of sequence can cause your system to cease responding to the mouse, the keyboard, or both.

1. In **Control Panel**, double-click the **System** icon. Click the **Device Manager** tab. In the list of device groups, double-click the **Modems** icon. Click to select the listing for your modem and then click the **Remove** button.

2. In **Control Panel** double-click the **Modems** icon. If your modem is listed, click once on the icon next to the modem and then click **Remove.**. If the New Hardware Found panel comes up, click **Cancel.** (Your modem should not be listed in the

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Modems section after you have deleted it from the **Device Manager**. If it is, this could be a sign that your Plug-N-Play settings are not correct. See "Does Not Install" for information about Plug-N-Play.)

3. Close all open programs and return to the Windows desktop. On the **Start** menu, click **Find,** then click **Files or Folders** and search for the files listed below. Type in the name and extension of each and click **Find.** Once you find each of the files listed, click the file name to select it then on the File menu choose Delete. (Do not delete these files from your modem installation diskette. You will need your diskette to reinstall the modem).

ltcom.vxd	ltwave.inf
ltmodem.vxd	ltdft.inf
ltvcd.vxd	ltdsvd.dll
ltmodem.sys	ltports.inf

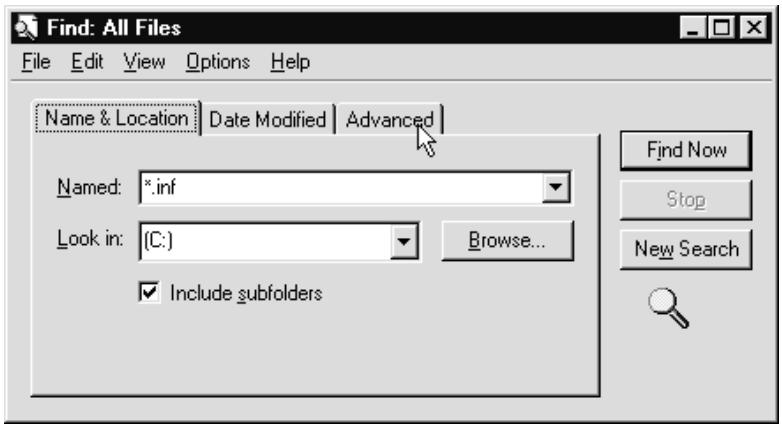
If you cannot find a particular file, it usually means it was not installed.

Note to users of Windows 95 and 98

If you are using Windows 95 or 98, there are two additional files which may be generateed when installing a piece of hardware from an OEM. The file is called oem#.inf. The number (#) used is generated by Windows 95 each time an additional piece of hardware is installed. In the case of the modem, these files wil have numbers between 1 and 99 reflected in the filename--"oem8.inf", for example

On the **Start** menu, click **Find** then click **Files or Folders**. At the first screen, type in **.inf* in the **Named:** box. Make sure your entire drive is selected. Click to select **Include subfolders** box. Be sure all the information is typed in as shown below.

Before beginning the search, select the **Advanced** tab.



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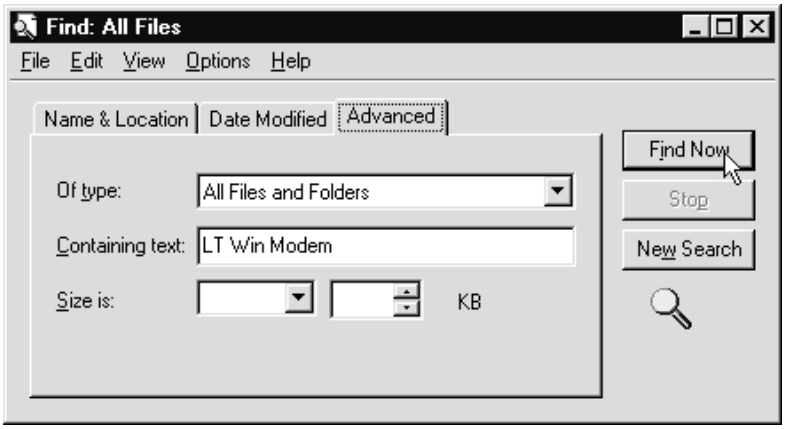
At the Advanced settings window, type the following in the "Containing text" field: *LT Win Modem*. Click **Find Now**.



When a file is found, it will have the name "oem#.inf." Delete only an oem inf file. To delete a file, highlight the file name by clicking once and then choose **Delete** from the **File** menu. After the file is deleted, you now need to find the other inf file. Go to the **Advanced** tab and type "LT_Win_Modem" in the "Containing text" field:

After Windows finds the other file, delete it as before. Restart your system and follow the installation procedures in the section of this manual titled "Installing the Modem."

Note to users of Windows NT

Windows NT 4.0 installation problems are often due to inadequate preparation. The following conditions must be meet before attempting to install the modem or it will not be seen or correctly installed by the system. (See the "Do This First" at the beginning of this manual).

- ISA Plug-N-Play support must be installed within Windows NT.
- Plug-N-Play OS must be enabled in your system BIOS.
- You must have the latest Service Pack upgrade installed.
- There must be a free IRQ and COM Port available for the modem.

If you need help on freeing an interrupt, see "Windows 95 Does Not Install" for a discussion of this topic. The "Special Situations" and "Plug-N-Play BIOS" sections also apply to Windows NT 4.0. Do not use the procedure in Windows 95 for uninstalling the modem.

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No Dialtone Error

Make sure you have connected the phone cable into the right connector on the back of the modem. See "Figure 7: Connecting Devices."

You may have too many devices connected to the phone line. Remove all other equipment.

Your modem may not recognize overseas dialtone. Use the AT command string "ATX0" to have the modem ignore the dialtone before dialing.

Communications Software Does Not Work

The communications software must be configured to the same COM Port and IRQ as the modem.

Does the communications software support this modem? See "Installing and Configuring Communications Software."

If you are using different communications software from that supplied with the modem, try installing the supplied software first to verify its functionality.

Nothing Appears On The Screen When I Type

Issue the command *ATE1* to the modem to enable command echo. This will let you see what you type.

Cannot Connect at 56K

Note: Current FCC regulations limit your maximum connection rate to 53Kbits/s.

The number you are calling may not support V.90 or K56flex protocols. Some Internet Service Providers have special numbers that you must call to make 56K connections. Contact your service provider and ask if the number you are using supports V.90 or K56flex.

Check the maximum speed setting in the **Modem Properties** window. In Control Panel, double-click the **Modems** icon. Highlight your modem by clicking once on the icon next to the modem and then click the **Properties** button. Select the **General** tab and look at the setting in the *Maximum speed* box. Make sure this is set to 115200.

You may have other telephone devices connected to the phone line. To achieve the best connection possible, remove all extra devices connected to the telephone line

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when the modem is in use. This includes extension phones, answering machines, cordless phone bases, caller ID boxes and their cables. This reduces the load on your phone line and keeps signal attenuation to a minimum.

Keep the length of your phone line cable to 10 feet or less. If necessary, move the computer closer to the phone socket. Don't lay your cabling close to an electrical appliance like a refrigerator or air conditioner unit. High current devices can transmit 60 cycle "hum" to your modem through the phone cord. This may cause frequent renegotiations or line disconnects while the appliance is running.

The telephone line conditions at the time of your call may not let you connect at 56K. The modem has a connection sequence of K56flex, then V.90, then V.34, and so on. The modem attempts to make the highest connect rate that your telephone line can support at the time of negotiation. If the line conditions (noise, telephone company routing, etc.) won't allow a high data rate connection, then the modem will automatically connect at the most reliable rate. Try making the call again after a few minutes. The routing of the call may improve your chances of making a 56K connection.

If you are attempting to make a call from an office and you have to dial "9" to reach an outside number, you are using a PBX. The modem cannot connect faster then V.34 if you are using a PBX. Try using the line that is connected to a fax machine. Fax machines are usually connected to a dedicated line and not a PBX.

Your phone line may not support or may only intermittently support a 56K connection. There are many conditions that must be met before a 56K connection can be established. The telephone company must have you connected to the (Public Switched Telephone Network) in a particular way. The modem you are calling must also support the same protocol.

The drivers for your modem are constantly being refined to address problems with compatibility, interoperability, and performance. Conditions that were thought insurmountable only months ago are now things of the past. As the industry converts to the new V.90 standard, current problems of connectivity and interoperability could also be things of the past. Check for driver upgrades on a regular basis. A problem connecting to a particular provider might be fixed by a simple software upgrade.

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Appendix A: AT Command Set

AT Commands

AT commands are issued to the modem to control the modem's operation and software configuration. AT commands can only be entered while the modem is in command mode. Enter AT commands by typing:

ATXn

where X is the AT command, and n is the specific value for that command. Press ENTER.

Any command issued is acknowledged with a response in either text or numeric values known as result codes. To issue multiple AT commands on the same command line, the commands are executed in the order they are received. Should execution of a command result in an error, or a character not be recognized as a valid command, execution is terminated, the remainder of the command line is ignored, and the ERROR result code is issued. Otherwise, if all commands execute correctly, only the result code associated with the last command shall be issued; result codes for preceding commands are suppressed.

In the following listing all commands and command values accepted by the modem are shown. Any entries other than those shown cause the ERROR result code.

+++ Escape sequence

The escape sequence allows the modem to exit data mode and enter on-line command mode. While in on-line command mode, you may communicate directly to your modem using AT commands. Once you are finished, you may return to data mode using the ATO command. A pause, the length of which is set by the Escape Guard Time S-Register (S12), must be used after an escape sequence is issued. This pause prevents the modem from interpreting the escape sequence as data. The value of the escape sequence character may be changed using Register S2.

A/ Repeat Last Command

This command repeats the last command string entered. Do not precede this command with an AT prefix or conclude it by pressing Enter.

A Answer Command

This command instructs the modem to go off-hook and answer an incoming call.

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Bn Communication Standard Setting

This command determines CCITT vs. Bell standard.

Command	Effect
B0	Selects CCITT V.22 mode when the modem is at 1200 bits/s.
B1	Selects Bell 212A when the modem is at 1200 bits/s (default).
B2	Unselects V23 reverse channel (same as B3).
B3	Unselects V23 reverse channel (same as B2).
B15	Selects V.21 when the modem is at 300 bits/s.
B16	Selects Bell 103J when the modem is at 300 bits/s (default).

Result Codes:

OK	n = 0, 1, 15, 16
ERROR	Otherwise

Cn Carrier Control

The modem will accept the C1 command without error in order to ensure backward compatibility with communications software that issues the C1 command. However, this modem does not support the C0 command. The C0 command may instruct some other modems to not send carrier (i.e., it puts them in a receive-only mode).

Command	Effect
C0	Transmit carrier always off.
C1	Normal transmit carrier switching.

Result Codes:

OK	n = 1
ERROR	Otherwise

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Dn Dial

This command instructs the modem to begin the dialing sequence. The dial string (n, including modifiers and the telephone number) is entered after the ATD command.

A dial string can be up to 40 characters long. Any digit or symbol (0-9, *, #, A, B, C, D) may be dialed as touch-tone digits. Characters such as spaces, hyphens, and parentheses do not count, they are ignored by the modem and may be included in the dial string to enhance readability.

The following characters may be used as dial string modifiers:

L	Redials last number. Should be the first character following ATD, ignored otherwise. The modem displays the dialing string in the following format: “Dialing…xxxxxxx” where “xxxxxxx” is the last number dialed.
P	Pulse dialing. (e.g. ATDPxxx. Dialing set to pulse as default.)
T	Touch-tone dialing (default). (e.g. ATDTxxx. Dialing set to tone as default.)
,	Pause during dialing. Pause for time specified in Register S8 before processing the next character in the dial string.
W	Wait for dial tone. Modem waits for a second dial tone before processing the dial string.
@	Wait for quiet answer. Wait for five seconds of silence after dialing the number. If silence is not detected, the modem sends a NO ANSWER result code back to the user.
!	Hook flash. Causes the modem to go on-hook for 0.5 seconds and then return to off-hook.
;	Return to command mode. Causes the modem to return to command mode after dialing the number, without disconnecting the call.
^	Disable data calling tone transmission.
S=n	Dial a telephone number previously stored using the &Zn=x command (see the &Zn=x command for further information). The range of n is 0-3.
$	Bong tone detection.

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En Echo Command

This command controls whether or not the characters entered from your computer keyboard are echoed back to your monitor while the modem is in command mode.

Command	Effect
E0	Disables echo to the computer.
E1	Enables echo to the computer (default).

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

Fn Online Data Character Echo Command

This command determines if the modem will echo data from the DTE. This modem does not support the F0 version of the command. However, the modem will accept F1, which may be issued by older communication software, to assure backward compatibility.

Command	Effect
F0	Online data character echo enabled (Not supported, will return ERROR).
F1	Online character echo disabled.

Result Codes:

OK	n = 1
ERROR	Otherwise

Hn Hook Control

This command instructs the modem to go on-hook to disconnect a call, or off-hook to make the phone line busy.

Command	Effect
H0	Modem goes on-hook (default).
H1	Modem goes off-hook.

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Result Codes:

OK	n = 0, 1
ERROR	Otherwise

In Request ID Information

This command displays specific product information about the modem.

Command	Effect
I0	Returns default speed and controller firmware version. (same as I3)
I1	Calculates ROM checksum and displays it on the DTE (e.g., 12AB).
I2	Performs a ROM check and calculates and verifies the checksum displaying OK or ERROR.
I3	Returns the default speed and the controller firmware version. (same as I0)
I4	Returns firmware version for data pump (e.g., 94).
I5	Returns the board ID; software version, hardware version, and country ID.
I6	Response OK
I7	Response OK
I8	Response OK
I9	Returns country code (e.g., North America Ver. 1).

Result Codes:

OK	n = 0-9
ERROR	Otherwise

Ln Monitor Speaker Volume

This command sets speaker volume to low, medium, or high.

Command	Effect
L0	Selects lowest volume.
L1	Selects low volume.
L2	Selects medium volume (default).
L3	Selects high volume.

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Result Codes:

OK	n = 0, 1, 2, 3
ERROR	Otherwise

Mn Monitor Speaker Mode

This command turns the speaker on or off.

Command	Effect
M0	The speaker is off.
M1	The speaker is on until the modem detects the carrier signal (default).
M2	The speaker is always on when modem is off-hook.
M3	The speaker is on until the carrier is detected, except while dialing.

Result Codes:

OK	n = 0, 1, 2, 3
ERROR	Otherwise

Nn Modulation Handshake

This command controls whether or not the local modem performs a negotiated handshake at connection time with the remote modem when the communication speed of the two modems is different.

Command	Effect
N0	When originating or answering, this is for handshake only at the communication standard specified by S37 and the ATB command.
N1	When originating or answering, begin the handshake only at the communication standard specified by S37 and the ATB command. During handshake, fallback to a lower speed may occur (default).

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

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On Return On-line to Data Mode

Command	Effect
O0	Instructs the modem to exit on-line command mode and return to data mode (see AT Escape Sequence, +++).
O1	This command issues a retrain before returning to on-line data mode.
O3	This command issues a rate renegotiation before returning to online data mode.

Result Codes:

OK	n = 0, 1, 3
ERROR	Otherwise

P Select Pulse Dialing

This command configures the modem for pulse (non-touch-tone) dialing. Dialed digits are pulsed until a T command or dial modifier is received. Tone dial is the default setting.

Qn Result Code Control

Result codes are informational messages sent from the modem and displayed on your monitor. Basic result codes are OK, CONNECT, RING, NO CARRIER, and ERROR. The ATQ command allows the user to turn result codes on or off.

Command	Effect
Q0	Enables modem to send result codes to the computer (default).
Q1	Disables modem from sending result codes to the computer.

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

T Select Tone Dialing

This command instructs the modem to send DTMF tones while dialing. Dialed digits are tone dialed until a P command or dial modifier is received. This is the default setting.

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Vn DCE Response Format

This command controls whether result codes (including call progress and negotiation progress messages) are displayed as words or their numeric equivalents.

Command	Effect
V0	Not supported. Results are always text.
V1	Displays result codes as text (default).

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

Wn Result Code Option

Command	Effect
W0	CONNECT result code reports DTE speed. Disable protocol result codes.
W1	CONNECT result code reports DTE speed. Enable protocol result codes.
W2	CONNECT result code reports DCE speed. Enable protocol result codes (default).

Result Codes:

OK	n = 0, 1, 2
ERROR	Otherwise

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This command enables tone detection options used in the dialing process. As these functions are chosen, the result codes are also affected. Therefore, this command is frequently used to control the modem chipset's responses. The primary function of this control is to control the modem chip set's call response capabilities.

Command	Result Code	Dial Tone Detect	Busy Tone Detect
X0	Disable	Disable	Disable
X1	Enable	Disable	Disable
X2	Enable	Enable	Disable
X3	Enable	Disable	Enable
X4	Enable	Enable	Enable (default)
X5	Enable	Enable	Enable
X6	Enable	Enable	Enable
X7	Disable	Enable	Enable

Extended Result Codes

Extended Result Codes	Effect
Disabled	Displays only the basic result codes OK, CONNECT, RING, NO CARRIER, and ERROR.
Enabled	Displays basic result codes, along with the connect message and the modem's data rate, and an indication of the modem's error correction and data compression operation.

Dial Tone Detect

Dial Tone Detect	Effect
Disabled	The modem dials a call regardless of whether it detects a dial tone. The period of time the modem waits before dialing is specified in register S6.
Enabled	The modem dials only upon detection of a dial tone, and disconnects the call if the dial tone is not detected within 10 seconds.

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Busy Tone Detect

Busy Tone Detect	Effect
Disabled	The modem ignores any busy tones it receives.
Enabled	The modem monitors for busy tones.

Result Codes:

OK	n = 0, 1, 2, 3, 4, 5, 6, 7
ERROR	Otherwise

Yn Long Space Disconnect

Long space disconnect is always disabled.

Command	Effect
Y0	Disable long space disconnect (default).
Y1	Enable long space disconnect. (Not supported.)

Result Codes:

OK	n = 0
ERROR	Otherwise

Zn Recall Stored Profile

This command instructs the modem chip set to go on-hook and restore the profile saved by the last &W command. Either Z0 or Z1 restores the same single profile.

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

&Bn V.32 Auto Retrain

This modem always auto retrains.

Command	Effect
&B0	Disable V.32 auto retrain (Not supported.)
&B1	Enable V.32 auto retrain (default).

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Result Codes:

OK	n = 1
ERROR	Otherwise

&Cn Data Carrier Detect (DCD) Control

Data Carrier Detect is a signal from the modem to your computer indicating that the carrier signal is being received from a remote modem. DCD normally turns off when the modem no longer detects the carrier signal.

Command	Effect
&C0	The state of the carrier from the remote modem is ignored. DCD circuit is always on.
&C1	DCD turns on when the remote modem's carrier signal is detected, and off when the carrier signal is not detected (default).

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

&Dn DTR Control

This command interprets how the modem responds to the state of the DTR signal and changes to the DTR signal.

Command	Effect
&D0	Ignore. The modem ignores the true status of DTR and treats it as always on. This should only be used if your computer does not provide DTR to the modem.
&D1	If the DTR signal is not detected while in on-line data mode, the modem enters command mode, issues OK result code, and remains connected.
&D2	If the DTR signal is not detected while in on-line data mode, the modem disconnects (default). If this signal is not present, the modem will not answer or dial.
&D3	Monitor DTR signal when an on-to-off transition occurs, the modem performs a soft reset as if the ATZ command was received.

Result Codes:

OK	n = 0, 1, 2, 3
ERROR	Otherwise

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&Fn Load Factory Settings

This command loads the configuration stored and programmed at the factory. This operation replaces all of the command options and the S-register settings in the active configuration with factory values.

Command	Effect
&F0	Recall factory setting as active configuration. (default)

&Gn V.22bis Guard Tone Control

This command determines which guard tone, if any, to transmit while transmitting in the high band (answer mode). This command is only used in V.22 and V.22bis mode. This option is not used in North America and is for international use only.

Command	Effect
&G0	Guard tone disabled (default).
&G1	Sets guard tone to 550 Hz.
&G2	Sets guard tone to 1800 Hz.

Result Codes:

OK	n = 0, 1, 2
ERROR	Otherwise

&Jn Auxiliary Relay option

Command	Effect
&J0	The auxiliary relay is never closed.
&J1	NOT SUPPORTED, responds ERROR.

Result Codes:

OK	n = 0
ERROR	Otherwise

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&Kn Local Flow Control Selection

Command	Effect
&K0	Disable flow control.
&K1	Reserved.
&K2	Reserved.
&K3	Enable RTS/CTS flow control (default).
&K4	Enable XON/XOFF flow control.

Result Codes:

OK	n = 0, 3, 4
ERROR	Otherwise

&Mn Asynchronous Communications Mode

Command	Effect
&M0	Asynchronous mode (default).
&M1	Reserved.
&M2	Reserved.
&M3	Reserved.
&M4	Reserved.

Result Codes:

OK	n = 0
ERROR	Otherwise

&Pn Pulse Dial Make-to-Break Ratio Selection

This Command is effective only for use in Japan.

Command	Effect
&P0	39/61 make/break ratio, 10PPS
&PI	33/67 make/break ratio, 10PPS (default)
&P2	33/67 make/break ratio, 20PPS

Result Codes:

OK	n = 0, 1, 2
ERROR	Otherwise

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&Qn Asynchronous Communications Mode

Command	Effect
&Q0	Asynchronous Mode, buffered. Same as \N0.
&Q1	Reserved.
&Q2	Reserved.
&Q3	Reserved.
&Q4	Reserved.
&Q5	Error Control Mode, buffered (default). Same as \N3.
&Q6	Asynchronous Mode, buffered. Same as \N0.
&Q7	Reserved.
&Q8	MNP error control mode. If an MNP error control protocol is not established, the modem will fallback according to the current user setting in S36.
&Q9	V.42 or MNP error control mode. If neither error control protocol is established, the modem will fallback according to the current user setting in S36.

Result Codes:

OK	n = 0, 5, 6, 8, 9
ERROR	Otherwise

&Sn Data Set Ready (DSR) Option

This command selects DSR action.

Command	Effect
&S0	DSR always ON (default).
&S1	DSR comes on when establishing a connection and goes off when the connection ends.

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

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&V0 View Active Configuration and Stored Profile

This command is used to display the active profiles.

Command	Effect
&V0	View active file

Below is an example of a possible output:

```
   Option                Selection          AT Cmd

   Comm Standard         Bell               B
   CommandCharEcho       Enable             E
   Speaker Volume        Medium             L
   Speaker Control       OnUntilCarrier     M
   Result Codes          Enable             Q
   Dialer Type           Tone               T/P
   ResultCode Form       Text               V
   ExtendResultCode      Enabled            X
   DialTone Detect       Enable             X
   BusyTone Detect       Enable             X
   LSD Action            Standard RS232     &C
   DTR Action            Standard RS232     &D

Press any key to continue; ESC to quit.

   Option                Selection          AT Cmd

   V22b Guard Tone       Disable            &G
   Flow Control          Hardware           &K
   Error Control Mode    V42, MNP, Buffer   \N
   Data Compression      V42bis/MNP5        %C
   AutoAnswerRing#       0                  S0
   AT Escape Char        43                 S2
   CarriageReturn Char   13                 S3
   Linefeed Char         10                 S4
   Backspace Char        8                  S5
   Blind Dial Pause      2 sec              S6
   NoAnswer Timeout      50 sec             S7
   “,“ Pause Time        2 sec              S8

Press any key to continue; ESC to quit.
```


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```
   Option                Selection          AT Cmd

   No Carrier Disc       2000 msec          S10
   DTMF Dial Speed       95 msec            S11
   Escape GuardTime      1000 msec          S12
   Data Calling Tone     Disabled           S35
   Line Rate             33600              S37
   DSVD mode             Disabled           -SSE

Stored Phone Numbers

&Z0=
&Z1=
&Z2=
&Z3=


OK
```

&Wn Store Current Configuration

This command stores certain command options and S-register values into the modem's nonvolatile memory. The ATZ command or a powerup reset of the modem restores this profile.

Result Codes:

OK	n = 0
ERROR	Otherwise

&Yn Select Stored Profile for Hard Reset

This command does not change the behavior of the modem but is included for compatibility with applications that issue the &Y0 command:

Command	Effect
&Y0	Select stored profile 0 on powerup
&Y1	ERROR

Result Codes:

OK	n = 0
ERROR	Otherwise

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&Zn=x Store Telephone Number

This command is used to store up to four dialing strings in the modem's nonvolatile memory for later dialing. The format for the command is &Zn = "stored number" where n is the location 0?3 to which the number should be written. The dial string may contain up to 40 characters. The ATDS = n command dials using the string stored in location n.

Result Codes:

OK	n = 0, 1, 2, 3
ERROR	Otherwise

\An Select Maximum MNP Block Size

The modem will operate an MNP error corrected link using a maximum block size controlled by the parameter supplied.

Command	Effect
\AO	64 characters
\A1	128 characters
\A2	192 characters
\A3	256 characters (Default)

Result Codes:

OK	n = 0, 1, 2, 3
ERROR	Otherwise

\Bn Transmit Break to Remote

In non-error correction mode, the modem will transmit a break signal to the remote modem with a length in multiples of 100ms according to parameter specified. The command works in conjunction with the \K command.

Command	Effect
\B1-\B9	Break length in 100ms units. (Default = 3.) (Non-error corrected mode only.)

Result Codes:

OK	If connected in data modem mode.
NO CARRIER	If not connected or connected in fax modem mode.

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\G Modem Port Flow Control

Command	Effect
\G0	Returns an “OK” for compatibility (default).
\G1	NOT SUPPORTED responds ERROR.

Result Codes:

OK	n = 0
ERROR	Otherwise

\J Adjust Bits/s Rate Control

When this feature is enabled, the modem emulates the behavior of modems that force the DTE interface to the line speed.

Command	Effect
\J0	Turn off feature (default).
\J1	Turn on feature.

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

\Kn Break Control

Controls the response of the modem to a break received from the DTE or the remote modem or the \B command. The response is different in three separate states. The first state is where the modem receives a break from the DTE when the modem is operating in data transfer mode:

Command	Effect
\K0	Enter on-line command mode, no break sent to the remote modem.
\K1	Clear data buffers and send break to remote modem.
\K2	Same as 0.
\K3	Send break to remote modem immediately.
\K4	Same as 0.
\K5	Send break to remote modem in sequence with transmitted data. (Default.)

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The second case is where the modem is in the on-line command state (waiting for AT commands) during a data connection, and the \B is received in order to send a break to the remote modem:

Command	Effect
\K0	Clear data buffers and send break to remote modem.
\K1	Clear data buffers and send break to remote modem. (Same as 0.)
\K2	Send break to remote modem immediately.
\K3	Send break to remote modem immediately. (Same as 2.)
\K4	Send break to remote modem in sequence with data.
\K5	Send break to remote modem in sequence with data. (Same as 4.) (Default)

The third case is where a break is received from a remote modem during a connection:

Command	Effect
\K0	Clear data buffers and send break to the DTE.
\K1	Clear data buffers and send break to the DTE. (Same as 0.)
\K2	Send a break immediately to DTE.
\K3	Send a break immediately to DTE. (Same as 2.)
\K4	Send a break in sequence with received data to DTE.
\K5	Send a break in sequence with received data to DTE. (Same as 4.)(Default)

Result Codes:

OK	n = 0, 1, 2, 3, 4, 5
ERROR	Otherwise

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\Nn Error Control Mode Selection

This command determines the type of error control used by the modem when sending or receiving data.

Command	Effect
\N0	Buffer mode. No error control (same as &Q6).
\N1	Direct mode.
\N2	MNP or disconnect mode. The modem attempts to connect in MNP 2-4 error control procedure. If this fails, the modem disconnects. This is also known as MNP reliable mode.
\N3	V.42, MNP, or buffer (default). The modem attempts to connect in V.42 error control mode. If this fails, the modem attempts to connect in MNP mode. If this fails, the modem connects in buffer mode and continues operation. This is also known as V.42/ MNP auto reliable mode (same as &Q5).
\N4	V.42 or disconnect. The modem attempts to connect in V.42 error control mode. If this fails, the call will be disconnected.
\N5	V.42 MNP or buffer (same as \N3)
\N7	V.42. MNP or buffer (same as \N3).

Result Codes:

OK	n = 0, 1, 2, 3, 4, 5, 7
ERROR	Otherwise

\Q Local Flow Control Selection

Command	Effect
\Q0	Disable flow control. Same as &K0.
\Q1	XON/XOFF software flow control. Same as &K4.
\Q2	CTS-only flow control. This is not supported, and the response is ERROR.
\Q3	RTS/CTS to DTE (default). Same as &K3.

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Result Codes:

OK	n = 0, 1, 3
ERROR	Otherwise

\Rn Ring indicator signal off after the telephone call is answered (Compatibility command)

Command	Effect
\R0	Ring indicator signal is off after the telephone call is answered

Result Codes:

OK	n = 0
ERROR	Otherwise

\Tn Inactivity Timer

This command specifies the length of time (in minutes) that the modem will wait before disconnecting when no data is sent or received. A setting of zero disables the timer. Alternatively, this timer may be specified in register S30. This function is only applicable to buffer mode.

Result Codes:

OK	n = 0-255
ERROR	Otherwise

\Vn Protocol Result Code

Command	Effect
\V0	Disable protocol result code
\V1	Enable protocol result code
\V2	Enable protocol result code

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Result Codes:

OK	n = 0, 1, 2
ERROR	Otherwise

\Xn XON/XOFF Pass Through

Command	Effect
\X0	Modem processes XON/XOFF flow control characters locally (default)
\X1	Modem processes and pass XON/XOFF flow control characters

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

-Cn Data Calling Tone

Data Calling Tone is a tone of certain frequency and cadence as specified in V.25 which allows remote Data/FAX/Voice discrimination. The frequency is 1300 Hz with a cadence of .5 s on and 2 s off.

Command	Effect
\X0	Modem processes XON/XOFF flow control characters locally (default)
\X1	Modem processes and pass XON/XOFF flow control characters

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

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-V90=x V.90 Downstream Rate and Control

Use this command to enable/disable V.90 connection and to control V.90 connection rates. The command syntax is `AT-V90=x`. Where *x* is a value from the list below.

AT-V90=n	Downstream Rate
0	V.90 disabled
1	Auto Rate (default)
2	28000 bits / s
3	29333 bits / s
4	30666 bits / s
5	32000 bits / s
6	33333 bits / s
7	34666 bits / s
8	36000 bits / s
9	37333 bits / s
10	38666 bits / s
11	40000 bits / s
12	41333 bits / s
13	42666 bits / s
14	44000 bits / s
15	45333 bits / s
16	46666 bits / s
17	48000 bits / s
18	49333 bits / s
19	50666 bits / s
20	52000 bits / s
21	53333 bits / s
AT-V90?	shows the current value and displays the selected rate.
AT-V90=?	show the range (0-21)

%B View Numbers in Blacklist

If blacklisting is in effect, this command displays the numbers for which the last call attempted in the past two hours failed. The ERROR result code appears in countries that do not require blacklisting.

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%Cn Enable/Disable Data Compression

Enables or disables data compression negotiation on an error corrected link.

Command	Effect
%C0	Disables data compression
%C1	Enables both V.42 bis and MNP 5 data compression

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

AT Commands for Testing and Debugging

The following commands are to be used for testing and debugging only and are not meant for general use.

&&C Write to/Read from DSP Register

Command	Effect
AT&&C<loc>-,<val>	writes the value <val> to DSP register at location <loc>.
AT&&C<loc>	reads from location <loc>.

&&L Line-to-Line Loopback

This command provides a loopback for line-to-line.

&&R Write to/Read from DSP RAM Location

Command	Effect
AT&&R<loc>,-<val>	writes the value <val> to DSP RAM location <loc>
AT&&R<loc>	reads from location <loc>

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&Tn Self-Test Commands

This command allows the user to perform diagnostic tests on the modem. These tests can help to isolate problems when experiencing periodic data loss or random errors.

Command	Effect
&T0	Abort. Stops any test in progress.
&T1	Local analog loop. This test verifies modem operation, as well as the connection between the modem and computer. Any data entered at the local DTE is modulated, then demodulated, and returned to the local DTE. To work properly, the modem must be off-line.
&T3	Local digital loopback test.
&T6	Remote digital loopback test. This test can verify the integrity of the local modem, the communications link, and the remote modem. Any data entered at the local DTE is sent to, and returned from, the remote modem. To work properly, the modems must be on-line with error control disabled.

Result Codes:

OK	n = 0
CONNECT	n = 1, 3, 6
ERROR	Otherwise

ATI11 Display Diagnostic Information for the last modem connection

The "ATI11" command displays the following diagnostic information for the last modem connection. A value of "NA" will be displayed if that parameter is not applicable for that connection.

Description	Example	Comments
Last Connection	V.34	56K/V.34/V.32 - The last data connection is successful. Failure-the last data connection failed.
Initial Transmit Carrier Rate	33600	The upload connection rate after initial negotiation.

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Description	Example	Comments
Initial Receive Carrier Rate	33600	The download connection rate after initial negotiation.
Final Transmit Carrier Rate	33600	The last upload connection rate.
Final Receive Carrier Rate	33600	The last download connection rate.
Protocol Negotiation Result	V.42	Possible results are: V.42, MNP or noEC
Data Compression Result	V.42bis	Possible results are: V.42bis, MNP5 or no Compression.
Estimated Noise Level	10	An average of the squared error between the received constellation point and the decision point.
Receive Signal Power Level	20	Receive signal (-dBm)
Transmit Signal Power Level	10	Transmit signal level (–dBm)
Round Trip Delay (msec)	60	Measured Round Trip Delay in milliseconds
Near Echo Level (-dBm)	39	Measured Near Echo Level
Far Echo Level (-dBm)	60	Measured Far Echo Level
Transmit Frame Count	5000	Number of HDLC frames transmitted.
Transmit Frame Error Count	10	Number of frame errors transmitted
Receive Frame Count	5000	Number of HDLC frames received.
Receive Frame Error Count	10	Number of frame errors received
Retrain and Rate Negotiate Event	1	Number of retrains initiated by the local modem.
Retrain and Rate Negotiate Event	1	Number of retrains initiated by the by remote modem.

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Description	Example	Comments
Call Termination Cause	0	0 -Call Terminated by Local modem 1 -Call Terminated by Remote modem 2 -No Answer - the Remote modem did not answer 3 -Training Failure - the modems failed to negotiate V.34 or 56K protocols. 4 -Protocol Failure - the modems failed to negotiate V.42 protocol.
Robbed-Bit Signaling (56K only)	6	The number of robbed bits detected.
Digital Loss	0	Digital Loss in dB.
Remote Server ID	XXX	ID number of remote server.

S-Registers Reference

S-registers generally affect how the AT commands perform. Contents of the registers can be displayed or modified when the modem is in command mode.

To display the value of an S-register, type

```
ATSn?
```

where n is the register number. Press ENTER.

To modify the value of an S-register, type

```
ATSn = r
```

where n is the register number, and r is the new register value. Press ENTER.

S0 Auto Answer Ring Number

Range: 0–255
Default: 0
Units: rings

This register determines the number of rings the modem will count before automatically answering a call. Enter 0 (zero) if you do not want the modem to automatically answer at all. When disabled, the modem can only answer with an ATA command.

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S1 **Ring Counter**

Range:	0–255
Default:	0
Units:	rings

This register, Ring Counter, is read only. The value of S1 is incremented with each ring. If no rings occur over a six second interval, this register is cleared.

S2 **AT Escape Character (user defined)**

Range:	0–255
Default:	43
Units:	ASCII

This register determines the ASCII valued used for an escape sequence. The default is the + character. The escape sequence allows the modem to exit data mode and enter command mode when on-line. Values greater than 127 disable the escape sequence.

S3 **Command Line Termination Character (user defined)**

Range:	0–127, ASCII decimal
Default:	13 (carriage return)
Units:	ASCII

This register determines the ASCII values as the carriage return character. This character is used to end command lines and result codes.

S4 **Response Formatting Character (user defined)**

Range:	0–127, ASCII decimal
Default:	10 (line feed)
Units:	ASCII

This register determines the ASCII value used as the line feed character. The modem uses a line feed character in command mode when it responds to the computer.

S5 **Command Line Editing Character (user defined)**

Range:	0–32, 127
Default:	8 (backspace)
Units:	ASCII

This register sets the character recognized as a backspace and pertains to asynchro-

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nous only. The modem will not recognize the backspace character if it is set to a value that is greater than 32 ASCII. This character can be used to edit a command line. When the echo command is enabled, the modem echoes back to the local DTE the backspace character, an ASCII space character, and a second backspace character. This means a total of three characters are transmitted each time the modem processes the backspace character.

S6 Wait Before Dialing

Range:	2-65
Default:	2
Units:	seconds

This register sets the length of time, in seconds, that the modem must wait (pause) after going off-hook before dialing the first digit of the telephone number. The modem always pauses for a minimum of two seconds, even if the value of S6 is less than two seconds. The wait for dial tone call progress feature (W dial modifier in the dial string) will override the value in register S6. This operation, however, may be affected by some ATX options according to country restrictions.

S7 Connection Completion Time-Out

Range:	1-255
Default:	50
Units:	seconds

This register sets the time, in seconds, that the modem must wait before hanging up because carrier is not detected. The timer is started when the modem finishes dialing (originate), or goes off-hook (answer). In originate mode, the timer is reset upon detection of an answer tone if allowed by country restriction. The timer also specifies the wait for silence time for the @ dial modifier in seconds. S7 is not associated with the W dial modifier.

S8 Comma Dial Modifier Time

Range:	0-65
Default:	2
Units:	seconds

This register sets the time, in seconds, that the modem must pause when it encounters a comma (“,”) in the dial command string.

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S10 Automatic Disconnect Delay

Range: 1-254
Default: 20
Units: 0.1 seconds

This register sets the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect. The actual interval the modem waits before disconnecting is the value in register S10.

S11 DTMF Dialing Speed

Range: 50-150
Default: 95
Units: 0.001 seconds

This register determines the dialing speed which is prefixed for each country.

S12 Escape Guard Time

Range: 0-255
Default: 50
Units: 0.02 seconds

This register sets the value (in 20 ms increments) for the required pause after the escape sequence (default 1s).

S14 General Bit Mapped Options Status

Indicates the status of command options. Only bit 2 and bit 5 are used, read only.

Bit 3 Result codes (Vn)
0 = Numeric (V0)
1 = Verbose (Vl) (Default)

Bit 6 Pulse dial PPS selection (&Pn)
0 = 10 PPS (&p0, &p1) (Default)
1 = 20 PPS (&p2)

Default: 8 (00001000b)

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S21 V.24/General Bit Mapped Options Status

Indicates the status of command options. Only bits 3, 4 and 5 are used, read only.

Bits 3-4 DTR behavior (&Dn)
0 = &D0 selected
1 = &D1 selected
2 = &D2 selected (Default)
3 = &D3 selected
Bit 5 DCD behavior (&Cn)
0 = &C0 selected
1 = &C1 selected (Default)

Default: 48 (00110000b)

S22 Results Bit Mapped Options Status

Indicates the status of command options. Only bits 4, 5 and 6 are used, read only.

Bits 4-6 result codes (Xn)
0 = X0 selected
4 = X1 selected
5 = X2 selected
6 = X3 selected
7 = X4 selected (Default)

Bit 7 Pulse dial make/break ratio (&Pn)
0 = 33/67 make/break ratio (&P1, &P2) (Default)
1 = 39/61 make/break ratio (&P0)

Default: 112 (01110000b)

S24 Timer to Control Sleep Mode

Range: 0, 5-255
Default: 10

This command displays the number of seconds of inactivity (no characters sent from the DTE, no RING) in the off-line command state before the modem places itself into standby mode. A value of zero prevents standby mode.

If a number between 1 and 4 is entered for this register, it will set the value to 5, and the inactivity before standby will be 5 seconds. This is done for compatibility with previous products which allowed time-outs down to 1s.

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S28 V.34 Modulation Enable/Disable

0 = disabled, 1-255 = enabled,
Range: 0-255
Default: 1

This register enables/disables V.34 modulation.

S30 Inactivity Timer

Range: 0-255
Default: 0
Units: minutes

S30 specifies the length of time (in minutes) that the modem will wait before disconnecting when no data is sent or received. This function is only applicable to buffer mode.

S32 Synthetic Ring Volume

Range: 0-255
Default: 10

This register specifies a synthetic ring volume in dB with an implied minus sign.

S33 Synthetic Ring Frequency

Range: 0-5
Default: 0

This register specifies a synthetic ring frequency. Valid ranges are 0-5, with 0= disabled and 1-5 corresponding to 5 ring frequencies.

S35 Data Calling Tone

0 = disabled, 1 = enableD
Range: 0-1
Default: 0

Data Calling Tone is a tone of certain frequency and cadence as specified in V.25 which allows remote Data/FAX/Voice discrimination. The frequency is 1300 Hz with a cadence of .5 s on and 2 s off.

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S36 Negotiation Fallback (default 7)

This register specifies the action to take in the event of negotiation failure when error control is selected.

S36 = 0, 2	Hang up.
S36 = 1, 3	Fall back to an asynchronous connection.
S36 = 4, 6	Attempt MNP. If MNP fails, hang up.
S36 = 5, 7	Attempt MNP. If MNP fails, fall back to asynchronous connection.

S37 Dial Line Rate (default 0)

S37 = 0	maximum modem speed
S37 = 1	reserved
S37 = 2	1200 bits/s and 75 bits/s
S37 = 3	300 bits/s
S37 = 4	reserved
S37 = 5	1200 bits/s
S37 = 6	2400 bits/s
S37 = 7	4800 bits/s
S37 = 8	7200 bits/s
S37 = 9	9600 bits/s
S37 = 10	12000 bits/s
S37 = 11	14400 bits/s
S37 = 12	16800 bits/s
S37 = 13	19200 bits/s
S37 = 14	21600 bits/s
S37 = 15	24000 bits/s
S37 = 16	26400 bits/s
S37 = 17	28800 bits/s
S37 = 18	31200 bits/s
S37 = 19	33600 bits/s

S38 56K Dial Line Rate (default 1)

There are 2 S-registers which support K56flex connections. S38 sets the maximum 56K downstream speed that the modem attempts to connect. To disable K56flex, set S38 to 0. The S37 register is used to control the upstream V.34 rate. (ref. V.34 Data/ Fax Document). (Note: Use the *AT-V90=x* command to control V.90 connections)

S38 = 0	K56flex disabled - V.34 connection (see S37)
S38 = 1	K56flex autorate - maximum achievable connection
S38 = 2	32000 bits / s
S38 = 3	34000 bits / s
S38 = 4	36000 bits / s

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S38 = 5	38000 bits / s
S38 = 6	40000 bits / s
S38 = 7	42000 bits / s
S38 = 8	44000 bits / s
S38 = 9	46000 bits / s
S38 = 10	48000 bits / s
S38 = 11	50000 bits / s
S38 = 12	52000 bits / s
S38 = 13	54000 bits / s
S38 = 14	56000 bits / s

S40 ETC Startup Autorating (default 0, range 0-2)

Range: 0-2
Default: 0

S20=0	Startup with normal autorating.
S20=1	Startup at initial rate of 4800 or below.
S20=2	Startup at initial rate of 9600 or below.

S42 Auto Rate (default 1, range 0-1)

0 = auto rate disabled, 1 = enabled.
Range: 0-1
Default: 1

This command is used for testing and debugging only. V.32bis and V.22bis auto rate is disabled. Retrain operation is disabled or enabled in data mode, and fallback is disabled in data mode.

S43 Auto Mode (default 1, range 0-1)

0 = auto mode disabled, 1 = enabled
Range: 0-1
Default: 1

This command is used for testing and debugging only. V.32bis startup auto mode operation is disabled.

S48 LAPM Error Control and Feature Negotiation (default 7)

S48 = 7	Negotiation enabled.
S 48 = 128	Negotiation disabled; forces immediate fallback options specified in S36.

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The following chart lists the S36 and S48 configuration settings necessary to negotiate certain types of connections:

	S48=7	S48 =128
S36 = 0, 2	LAPM or hangup	do not use
S36 = 1, 3	LAPM or async	async
S36 = 4, 6	LPAM, MNP, or hangup	MNP or hangup
S36 = 5, 7	LAPM, MNP, or async	MNP or async

S89 Timer to Control Sleep Mode

Range: 0, 5-255
Default: 10

This command displays the number of seconds of inactivity (no characters sent from the DTE, no RING) in the off-line command state before the modem places itself into standby mode. A value of zero prevents standby mode.
If a number between 1 and 4 is entered for this register, it will set the value to 5, and the inactivity before standby will be 5 seconds. This is done for compatibility with previous products which allowed time-outs down to 1s.

S90 Local Phone Status

0 = local phone on-hook
1 = local phone off-hook

This register tells the status of the local phone. It is read only.

S91 Line Transmit Level

Range: 6-15
Default: 15
Units: 1 dB

This register is effective only for Japan. It specifies the line transmit level in dB with an implied minus sign.

S92 Direct Connect Transmit Level (default 20)

Sets the transmit level, in dBm for direct connect. This value may have different settings for different phones.

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The Result Code Summary

Result Code	Description
OK	Command executed
CONNECT	Modem connected to line
RING	A ring signal has been detected
NO CARRIER	Modem lost carrier signal, or does not detect carrier signal, or does not detect answer tone
ERROR	Iinvalid command
CONNECT 1200 EC*	Connection at 1200 bits/s
NO DIALTONE	No dial tone detected
BUSY	Busy signal detected
NO ANSWER8	No quiet answer
CONNECT 2400 EC*	Connection at 2400 bits/s
CONNECT 4800 EC*	Connection at 4800 bits/s
CONNECT 9600 EC*	Connection at 9600 bits/s
CONNECT 14400 EC*	Connection at 14400 bits/s
CONNECT 19200 EC*	Connection at 19200 bits/s
CONNECT 7200 EC*	Connection at 7200 bits/s
CONNECT 12000 EC*	Connection at 12000 bits/s
CONNECT 16800 EC*	Connection at 16800 bits/s
CONNECT 300 EC*	Connection at 300 bits/s
CONNECT 21600 EC*	Connection at 21600 bits/s
CONNECT 24000 EC*	Connection at 24000 bits/s
CONNECT 26400 EC*	Connection at 26400 bits/s
CONNECT 28800 EC*	Connection at 28800 bits/s
CONNECT 31200 EC*	Connection at 31200 bits/s
CONNECT 33600 EC*	Connection at 33600 bits/s
CONNECT 38400 EC*	Connection at 38400 bits/s
CONNECT 57600 EC*	Connection at 57600 bits/s
CONNECT 115200 EC	Connection at 115200 bits/s
DELAYED	Delay is in effect for the dialed number
BLACKLISTED	Dialed number is blacklisted
BLACKLIST FULL	Blacklist is full
CONNECT 32000 EC*	Connection at 32000 bits/s, 56K rate
CONNECT 34000 EC*	Connection at 34000 bits/s, 56K rate
CONNECT 36000 EC*	Connection at 36000 bits/s, 56K rate
CONNECT 38000 EC*	Connection at 38000 bits/s, 56K rate
CONNECT 40000 EC*	Connection at 40000 bits/s, 56K rate
CONNECT 42000 EC*	Connection at 42000 bits/s, 56K rate
CONNECT 44000 EC*	Connection at 44000 bits/s, 56K rate
CONNECT 46000 EC*	Connection at 46000 bits/s, 56K rate
CONNECT 48000 EC*	Connection at 48000 bits/s, 56K rate
CONNECT 50000 EC*	Connection at 50000 bits/s, 56K rate
CONNECT 52000 EC*	Connection at 52000 bits/s, 56K rate
CONNECT 54000 EC*	Connection at 54000 bits/s, 56K rate
CONNECT 56000 EC*	Connection at 56000 bits/s, 56K rate
CONNECT 58000 EC*	Connection at 58000 bits/s, 56K rate
CONNECT 60000 EC*	Connection at 60000 bits/s, 56K rate
CONNECT 28000 EC*	Connection at 28000 bits/s, V.90 rate
CONNECT 29333 EC*	Connection at 29333 bits/s, V.90 rate
CONNECT 30666 EC*	Connection at 30666 bits/s, V.90 rate
CONNECT 32000 EC*	Connection at 32000 bits/s, V.90 rate
CONNECT 33333 EC*	Connection at 33333 bits/s, V.90 rate

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CONNECT 34666 EC*	Connection at 34666 bits/s, V.90 rate
CONNECT 36000 EC*	Connection at 36000 bits/s, V.90 rate
CONNECT 37333 EC*	Connection at 37333 bits/s, V.90 rate
CONNECT 38666 EC*	Connection at 38666 bits/s, V.90 rate
CONNECT 40000 EC*	Connection at 40000 bits/s, V.90 rate
CONNECT 41333 EC*	Connection at 41333 bits/s, V.90 rate
CONNECT 42666 EC*	Connection at 42666 bits/s, V.90 rate
CONNECT 44000 EC*	Connection at 44000 bits/s, V.90 rate
CONNECT 45333 EC*	Connection at 45333 bits/s, V.90 rate
CONNECT 46666 EC*	Connection at 46666 bits/s, V.90 rate
CONNECT 48000 EC*	Connection at 48000 bits/s, V.90 rate
CONNECT 49333 EC*	Connection at 49333 bits/s, V.90 rate
CONNECT 50666 EC*	Connection at 50666 bits/s, V.90 rate
CONNECT 52000 EC*	Connection at 52000 bits/s, V.90 rate
CONNECT 53333 EC*	Connection at 53333 bits/s, V.90 rate

* EC only appears when the Extended Result Codes configuration option is enabled. EC is replaced by one of the following symbols, depending upon the error control method used:

V42bis—V.42 error control and V.42bis data compression.
V42—V.42 error control only.
MNP 5— MNP class 4 error control and MNP class 5 data compression.
MNP 4— MNP class 4 error control only.
NoEC—No error control protocol.

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Appendix B: Communications Regulations

FCC Regulations

The following statements are provided in accordance with the Federal Communications Commission (FCC) regulations. Please read these statements carefully before installing your modem.

FCC Part 68 Requirements

This equipment complies with Part 68 of the FCC Rules. On the bottom of this equipment is a label that contains, among other information, the FCC Registration Number and Ringer Equivalence Number (REN) for this equipment. If requested, this information must be given to the telephone company.

The REN is used to determine the maximum number of devices connected to your telephone line that will ring in response to an incoming call. In most, but not all, areas, the total REN of devices connected to a line should not exceed five (5.0). To find out the total permitted in your area, contact your local telephone company.

If your telephone equipment causes harm to the telephone network, the telephone company can discontinue your service temporarily. If possible, the company will notify you in advance. But if advance notice isn't practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC.

Your telephone company can make changes in its facilities, equipment, operations, or procedures that could affect the operation of your equipment. If so, you will be notified in advance so you can make the changes needed to maintain uninterrupted service.

If you experience trouble with this equipment, please contact the manufacturer at the address given in this manual. The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment in is not malfunctioning.

This equipment may not be used on public coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

Declaration of Conformity

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installa-

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tion. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio and television reception, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAUTION: CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

Canadian Department Of Communications (CDOC)

Requirements for End Users:

Notice: The Canadian Department of Communications label identifies certified equipment. This certification means the equipment meets certain telecommunications network requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment users should ensure that connection to the line is allowed by the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a telephone extension cord. Compliance with the above conditions may not prevent degradation of service in certain situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

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